



CK-12 Earth Science For High School Quizzes and Tests



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Dana Desonie

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CHAPTER

1

HS What is Earth Science? Assessments

Chapter Outline

- 1.1 THE NATURE OF SCIENCE
 - 1.2 EARTH SCIENCE AND ITS BRANCHES
 - 1.3 WHAT IS EARTH SCIENCE?
-

- The answer keys can be found in the Resource tab above the Table of Contents.

1.1 The Nature of Science

Lesson Quiz

Name_____ Class_____ Date_____

Multiple Choice

Circle the letter of the correct choice.

1. A mathematical model is a(n)
 - a. definition that explains how the earth works
 - b. set of equations that represent natural processes
 - c. physical representation of the subject being studied
 - d. model that cannot be tested
2. If a hypothesis explains all the data, there is a whole lot of data, and none of the data contradicts the hypothesis, the hypothesis becomes a(n)
 - a. law
 - b. conclusion
 - c. theory
 - d. secondary hypothesis
3. If performing an experiment in the field, you should
 - a. wear appropriate clothes
 - b. bring enough food and water
 - c. tell others where you are going
 - d. all of the above
4. The lab instructor should be notified when
 - a. anyone is hurt or anything is damaged
 - b. you need an eraser to correct a mistake in your notebook
 - c. you hear a joke and it made you laugh
 - d. there is never a need to notify the lab instructor
5. The way scientists approach their work is called
 - a. faith-based
 - b. scientific method
 - c. program management
 - d. scientific notation
6. To support or refute a hypothesis, scientists must collect
 - a. influence
 - b. donations
 - c. opinions
 - d. data
7. When should you follow instructions in the lab?

- a. at the end of class
 - b. always
 - c. when the teacher is looking
 - d. only when there is a fire
8. Which of the following best describe a hypothesis?
- a. A plausible explanation
 - b. A questionable assumption
 - c. A pretty good guess
 - d. The closest match
9. Which of the following is not a scientific model?
- a. problematic
 - b. conceptual
 - c. mathematical
 - d. physical
10. The goal of science is to
- a. disprove religious ideas
 - b. find the absolute indisputable truth
 - c. make tremendous inventions to advance humankind
 - d. understand the natural world
11. An independent variable
- a. is the change that occurs because a measurement is not made precisely.
 - b. inconsistent with the results from other experiments.
 - c. is the factor that will be manipulated.
 - d. is the result of the experiments.
12. Which of the following is not an assumption that scientists must make?
- a. Natural laws are the same everywhere and at any time.
 - b. Scientific ideas are less likely to be shown to be wrong the more they have been tested.
 - c. A scientific idea will be accepted if there is only a small amount of evidence that goes against it.
 - d. Scientific ideas can change or be thrown out, as needed.

True or False

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

- _____ 13. Always follow instructions in the lab
- _____ 14. Never eat or drink in the lab
- _____ 15. A scientific question does not need to be testable
- _____ 16. An dependent variable can be manipulated
- _____ 17. Science should not make moral judgments

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A scientific question must be able to be proven wrong; that is it must be _____.
19. A _____ is a plausible answer to a question.
20. A _____ model ties together many ideas in an attempt to explain a phenomenon.
21. A hypothesis that has been repeatedly tested that has no significant evidence against it is called a(n) _____.

22. A touchable representation of an object, such as a globe, is a _____.
23. $F = G \frac{m_1 m_2}{r^2}$ is a _____ of gravity.
24. In the experiment the _____ were kept the same while the independent variable was tested.
25. The role of _____ is to monitor scientific work.

Short Answer

Answer each question in the space provided.

26. List the steps involved in the scientific approach to solving a problem.

27. Why are student scientists sometimes told that they should try to disprove their hypotheses?

Answer Key

1. b 2. c 3. d 4. a 5. b 6. d 7. b 8. a 9. a 10. d 11. c 12. c
13. true 14. true 15. false 16. false 17. true
18. testable 19. hypothesis 20. conceptual 21. theory 22. physical model 23. mathematical model 24. dependent variable 25. community
26. Ask a question, do background research, create a hypothesis, conduct one or more experiments, analyze your data, determine how it provides evidence for or against your hypothesis, communicate your results
27. If a scientist puts all of her efforts into disproving her hypothesis and she cannot do it, then the hypothesis is likely to have validity. If a scientist tries to prove her hypothesis, she may miss important clues that it is not valid. }

1.2 Earth Science and Its Branches

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A tsunami would probably be best understood by a(n)
 - a. climatologist
 - b. oceanographer
 - c. tsunamiest
 - d. astronomer
2. Minerals are studied primarily by a
 - a. miner
 - b. astrologer
 - c. geologist
 - d. meteorologist
3. The study of weather patterns is known as
 - a. meteorology
 - b. geology
 - c. astronomy
 - d. oceanography
4. What is geology?
 - a. the study of Earth's oceans
 - b. the study of weather
 - c. the study of the stars
 - d. the study of Earth
5. Which area of Earth science includes the study of ancient organisms?
 - a. astronomy
 - b. meteorology
 - c. geology
 - d. paleontology
6. Which area of Earth science includes the study of stars?
 - a. astronomy
 - b. geology
 - c. hydrology
 - d. meteorology
7. Which branch of Earth science would most likely use telescopes
 - a. geology

- b. astrology
 - c. astronomy
 - d. climatology
8. Which branch of science studies the effects people have on their environment?
- a. environmental science
 - b. archeology
 - c. meteorology
 - d. geology
9. Which is not a branch of Earth science?
- a. oceanography
 - b. climatology
 - c. astronomy
 - d. astrology
10. The branch Earth science that deals with 70 percent of Earth's surface is
- a. oceanography
 - b. climatology
 - c. environmental science
 - d. meteorology

True or False

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

- _____ 11. Physical oceanographers are concerned with the motion of ocean water.
- _____ 12. Scientists that primarily study earthquakes are called seismologists
- _____ 13. Meteorologists are interested in the study of meteors
- _____ 14. Climatologists forecast weather for the upcoming week
- _____ 15. Astronomers study stars to understand people's horoscopes

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The five major branches of Earth science are geology, astronomy, oceanography, environmental science and _____.
17. The branch of Earth science that studies water in all its forms is called _____.
18. The type of scientist would be best suited to provide scientific information leading to the clean up of pollution in a lake is a(n) _____.
19. Scientists that study the rocks and geologic processes within the ocean basins are _____.
20. A _____ is a scientist who predicts the weather.
21. A _____ is a scientist who understands weather over a long period of time.
22. A scientists who studies the rocks and processes on Mars is a(n) _____.
23. _____ consider how natural processes create and destroy materials on Earth.

Short Answer

Answer each question in the space provided.

24. What does a geologist study?

25. How is geology different from Earth Science?

Answer Key

1. b 2. c 3. a 4. d 5. d 6. a 7. c 8. a 9. d 10. a

11. true 12. true 13. false 14. false 15. false

16. meteorology and/or climatology 17. hydrology 18. environmental scientist 19. marine geologists 20. meteorologist 21. climatologist 22. planetary geologist 23. geologists

24. A geologist studies Earth's solid material and structures and the processes that create them.

25. Geology is the study of solid Earth. Earth Science includes geology but is also concerned with other aspects of the planet, including the atmosphere and oceans, plus the environment of space that the planet is in. }

1.3 What is Earth Science?

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A contour line
 - a. connects points of equal value
 - b. must not cross another contour line.
 - c. must create a loop with itself.
 - d. all of the above
2. What is the goal of science?
 - a. collect data.
 - b. understand the natural world.
 - c. provide answers to all questions.
 - d. all of the above.
3. Which of the following is NOT part of the scientific method?
 - a. determine scientific laws.
 - b. question.
 - c. experiment.
 - d. collect data.
4. What are factors that must remain the same in an experiment called?
 - a. controls.
 - b. independent variables.
 - c. dependent variables.
 - d. conclusions.
5. Which of the following is an example of a physical model?
 - a. sets of equations.
 - b. weather predictions.
 - c. a globe.
 - d. climate projections.
6. What is not usually found in a map legend?
 - a. scale
 - b. north arrow
 - c. title
 - d. date
7. How much of the Earth's surface is covered in water?
 - a. 50%

- b. 60%
 - c. 70%
 - d. 80%
8. What do paleontologists study?
- a. fossils.
 - b. rocks.
 - c. minerals.
 - d. the moon.
9. What type of map shows changes in elevation on Earth's surface?
- a. Mercator projection
 - b. gnomonic projection
 - c. topographic map
 - d. GPS
10. What is the study of water and its movement called?
- a. climatology.
 - b. meteorology.
 - c. geology.
 - d. hydrology.

True or False

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

- _____ 11. Once a theory has been accepted it can never be retracted.
- _____ 12. Scientists draw conclusions only from data collection.
- _____ 13. A theory can be used to predict behavior.
- _____ 14. The scientific community monitors scientific integrity.
- _____ 15. Scientific data is always quantitative.
- _____ 16. The public controls the quality and types of scientific research.
- _____ 17. Peer review is an important part of the publication process in science.
- _____ 18. Science can answer every question.
- _____ 19. Climate is an example of a system that is easy to model because all the factors are and their interactions are well understood.
- _____ 20. Scientists quite commonly fake data.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. _____ is the study of Earth's solid materials and structures that create them.
22. When all of the scientific data support a hypothesis none contradicts the hypothesis, the hypothesis may become a(n) _____.
23. _____ use radars and satellites to forecast the weather.
24. The _____ is the way scientists approach their work.
25. A plausible explanation that answers a scientific question is called a(n) _____.
26. _____ helps scientists to visually understand the relationships between data.

27. A _____ model ties together many ideas in an attempt to explain a phenomenon.
28. _____ deals with any and all aspects of the Earth.
29. _____ can help us better understand how and why climate changes.
30. _____ scientists study the effects people have on their environment, including the landscape, atmosphere, water, and living things.

Short Answer

Answer each question in the space provided.

31. Explain how science works when new evidence is found.
32. Explain the importance of peer review.
33. Explain the importance of independent and dependent variables in an experiment. Why is only one variable allowed to change?
34. Describe what a theory is and why a theory might be rejected by the scientific community.

35. Why is it nearly impossible that an established theory, like the theory of evolution, will be rejected by the scientific community?

Answer Key

1. d 2. b 3. d 4. a 5. c 6. a 7. c 8. a 9. b 10. d

11. false 12. false 13. true 14. true 15. false 16. false 17. true 18. false 19. false 20. false

21. geology 22. theory 23. meteorologists 24. scientific method 25. hypothesis 26. graph 27. conceptual 28. Earth Science 29. Climatologists 30. environmental

31. Science will change as new data is found. If the data do not support a hypothesis, the hypothesis is modified or withdrawn. If the data do support a hypothesis, more experiments and observations will be done to continue to test the hypothesis.

32. Scientists monitor other scientists by peer review. When a scientist submits a paper for publication that paper is sent out to other scientists for peer review. The reviewers suggest changes so that the paper demonstrates sound science.

33. The independent variable is what is being tested. It is the only factor in the experiment that is allowed to change. The dependent variables must stay the same. If more than one variable is changed during the experiment then it is impossible to know what caused the effects seen.

34. A theory is a complex explanation that has a great deal of data in its support and no significant data that does not support it. If scientists find data that do not support the theory, the theory will need to be revised. If it cannot be revised or if there is more data found that does not support the theory, it will be rejected.

35. The theory of evolution has withstood an incredible amount of scrutiny. There have been countless observations and experiments done to test it. All of them have been found to support the theory. When a detail in the theory has been found to be inconsistent with the data, that portion of the theory has been revised. Longstanding theories have been around a long time because they are exceptional at explaining the relevant data and observations. }

CHAPTER 2

HS Studying Earth's Surface Assessments

Chapter Outline

- 2.1 EARTH'S SURFACE**
 - 2.2 WHERE IN THE WORLD ARE YOU?**
 - 2.3 MODELING EARTH'S SURFACE**
 - 2.4 TOPOGRAPHIC MAPS**
 - 2.5 USING SATELLITES AND COMPUTERS**
 - 2.6 STUDYING EARTH'S SURFACE**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

2.1 Earth's Surface

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. For the most part, _____ are much older than _____.
 - a. ocean basins, continents
 - b. continents, ocean basins
 - c. volcanoes, continents
 - d. ocean basins, volcanoes
2. Ocean basins are all younger than
 - a. 65 million years
 - b. 180 thousand years
 - c. 4.4 billion years
 - d. 180 million years
3. Which is not an important force of erosion?
 - a. ice
 - b. heat
 - c. water
 - d. wind
4. Which of the following are typically found in elevated regions in the mid ocean?
 - a. ridges
 - b. canyons
 - c. basins
 - d. trenches
5. Crustal deformation occurs when two slabs of crust
 - a. collide
 - b. slide past each other
 - c. pull apart
 - d. all of the above

True or False

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

- _____ 6. The oldest continental rocks are millions of years old.
- _____ 7. Earth's surface is constantly changing
- _____ 8. Mountains rise when continents collide

_____ 9. The continental margin is made of oceanic crust.

_____ 10. Destructive forces cause landforms to grow

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

11. The deepest places in the oceans are the _____.

12. _____ forces cause landforms to grow.

13. Agents of erosion that wear down landforms are _____ forces.

14. The _____ is the longest mountain range on Earth.

15. The large flat areas covered by the ocean is known as a(n) _____.

16. Landforms are created when _____ are deposited.

17. Large land areas extending from high mountaintops to offshore are called _____.

Short Answer

Answer each question in the space provided.

18. Describe the destructive forces that cause landforms to get smaller or disappear.

19. How do the continents and ocean basins differ on a relief map?

20. Describe the types of processes that can change Earth's surface.

Answer Key

1. b 2. d 3. b 4. a 5. d

6. false 7. true 8. true 9. false 10. false

11. trenches 12. constructive forces 13. destructive 14. mid-ocean ridge 15. ocean basin 16. sediments 17. continents

18. Volcanic eruptions can blow landforms, like volcanoes, apart. Water, wind, ice and gravity erode material that destroys landforms over time.

19. The continents are much thicker and rise higher. The ocean basins are thinner and deeper.

20. Landforms are built up by constructive processes. These include volcanic activity or uplift of the Crust. Existing landforms are modified or destroyed by destructive forces. These include volcanic eruptions or erosion. }

2.2 Where in the World Are You?

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. How many degrees is Earth's magnetic north pole offset from its geographic north pole?
 - a. 0
 - b. 5.5
 - c. 11.5
 - d. 22.5
2. On a map, are the lines that run parallel to the equator called?
 - a. lines of longitude
 - b. lines of contour
 - c. lines of latitude
 - d. lines of borealis
3. What is the longitude of the prime meridian?
 - a. 0
 - b. 37
 - c. 90
 - d. 180
4. A figure drawn on a map or nautical chart that shows the locations of north, east, south, and west is called a
 - a. sightline
 - b. compass rose
 - c. compass
 - d. standard line
5. Elevation is the height above or below
 - a. Mt. Everest
 - b. the ground
 - c. sea level
 - d. Death Valley
6. On a compass rose, SE means
 - a. Solar Electricity
 - b. South East
 - c. Sun Ends
 - d. Sort of East
7. What feature on a map shows the ratio of map distance to actual earth distance?
 - a. map legend

- b. contour line
 - c. map symbol
 - d. map scale
8. ESE is most accurately described as lying between
- a. E and W
 - b. N and S
 - c. E and S
 - d. E and SE
9. What is the minimum number of points needed for triangulation?
- a. 1
 - b. 2
 - c. 3
 - d. 4
10. What is the reference point for lines of latitude?
- a. the equator
 - b. the prime meridian
 - c. the International Date Line
 - d. the North Pole

True or False

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

- _____ 11. Earth's geographic north pole is the point where the axis of revolution intersects the planet's surface in the north.
- _____ 12. The South Pole is located at 180 degrees south.
- _____ 13. The International Date Line is located at 180 degrees.
- _____ 14. All longitude lines pass through both the North & South poles
- _____ 15. The topography of a region is the height or depth of that feature relative to sea level.
- _____ 16. One degree latitude is divided into 100 minutes. One minute latitude is divided into 100 seconds.
- _____ 17. One degree longitude is divided into 60 minutes. One minute latitude is divided into 60 seconds.
- _____ 18. At the Prime Meridian a new day will dawn 12 hours after it arrived at the International Date Line.
- _____ 19. A compass needle aligns with geographic north.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

20. A line connecting two locations has a _____
21. The _____ has a latitude of 0 degrees.
22. A _____ is shown on a map to indicate north.
23. A line between a starting and ending point will have a _____.
24. All major features of landforms of a region make up its _____.
25. There are _____ of latitude between the Equator and the North Pole.
26. The height or depth of a region relative to sea level is called its _____.
27. The term for giving a location in the third dimension is _____.

Short Answer

Answer each question in the space provided.

28. How is sea level determined?

29. What is the difference between location and direction?

30. Where does $00^{\circ}00'00''\text{N}$ occur? How about $90^{\circ}00'00''\text{N}$?

31. What is the International Date Line? Where is it located and what happens there?

32. What would be the best way to locate an earthquake?

Answer Key

1. c 2. c 3. a 4. b 5. c 6. b 7. d 8. d 9. c 10. a

11. false 12. false 13. true 14. true 15. true 16. false 17. true 18. true 19. false

20. direction 21. equator 22. compass rose 23. direction 24. relief 25. 90-degrees 26. topography 27. elevation

28. Sea level is measured by the average of the ocean's high and low tides.

29. Location is one point on a map, where as direction is a minimum of two points with a start and end point.

30. $00^{\circ}00'00''\text{N}$ = the equator, $90^{\circ}00'00''\text{N}$ = the North pole

31. The International Date Line is located on the 180 degree meridian. This meridian is where a new day dawns first. So imagine it is December 31 all around the world. The first places that wakes up to a new year are located along the 180 degree meridian.

32. The location of earthquakes are best determined by triangulation from 3 or more separate monitoring stations }

2.3 Modeling Earth's Surface

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The shape of planet Earth is closest to a
 - a. circle
 - b. sphere
 - c. cone
 - d. rectangle
2. A map that uses contour lines to reveal landforms is a(n)
 - a. radar map
 - b. weather map
 - c. topographic map
 - d. global map
3. Which coordinate system is best for curved surfaces?
 - a. Mercator
 - b. Cartesian
 - c. longitude and latitude
 - d. polar
4. Which projection has correct features at the equator, but highly distorted features near the poles?
 - a. Mercator
 - b. Robinson
 - c. Gnomonic
 - d. Conic
5. Which projection results in a map that is an ellipse rather than a rectangle?
 - a. Mercator
 - b. Robinson
 - c. Gnomonic
 - d. Conic

True or False

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

- _____ 6. The shortest distance on a globe is the length of an arc.
- _____ 7. In a Mercator projection, compass directions are not straight lines, but a straight line is the shortest distance between the two points.
- _____ 8. The National Geographic Society uses the Winkel Tripel Projection

_____ 9. Maps are models.

_____ 10. A location on a globe must be determined using polar coordinates because a globe is curved.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

11. Maps are _____ representations of a _____ Earth

12. A _____ projection would be best to map Hawaii.

13. A _____ map shows average temperatures and rainfall for a region.

14. In a conic map, the location where a map is least distorted is where _____.

15. A Robinson projection is best at around _____ latitude.

Short Answer

Answer each question in the space provided.

16. Why are maps necessary?

17. Why is a globe better than a map? Why is a map better than a globe?

18. How could you tell the distance between two points on a globe in miles?

Answer Key

1. b 2. c 3. d 4. a 5. b

6. true 7. false 8. true 9. true 10. true

11. 2-dimensional, 3-dimensional 12. conic 13. climate 14. the cone touches the globe 15. within 45-degrees of the equator.

16. Maps provide a two-dimensional representation of Earth's surface. They can be made to show what the user needs them to show. They are portable.

17. A globe is better than a map because it better represents the shape of the planet. Features are not distorted on a globe and they are true to scale. A globe is difficult to deal with relative to a map because it is harder to carry around. Most globes show the planet as a whole and are not good for a detailed view.

18. Pull a string taut between the two locations and mark both locations. Lay the string on the equator of the globe. Count the number of degrees between the marks, starting with one end at 0. The number of miles per degree at the equator is 69.17; now multiply the number of degrees by that number to get the distance in miles between the two locations.}

2.4 Topographic Maps

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A bathymetric map shows
 - a. depths below sea level
 - b. tree heights
 - c. distance away from the equator
 - d. heights above sea level
2. A geologic map primarily shows
 - a. rock types of a region
 - b. elevation of a region
 - c. geometry of a region
 - d. depth of a region
3. At which scale would features appear at their actual size?
 - a. 1:24,000
 - b. 1:100,000
 - c. 1:01:00
 - d. 1:250,000
4. If a hill has an elevation of 100 ft. and there are 5 contour lines, what is the contour interval?
 - a. 100 ft.
 - b. Each interval is different.
 - c. 500 ft.
 - d. 20 ft.
5. Which of the following represents a basin on a topographic map?
 - a. index contours
 - b. contour intervals
 - c. hatch lines pointing in
 - d. map legends
6. If two contour lines appear to touch it means
 - a. there are at least two elevations at that location.
 - b. the elevation does not change at that location.
 - c. the contour interval is too small.
 - d. the slope is very steep.
7. On a topographic map, Vs that point uphill indicate
 - a. there is a stream channel.

- b. there is a rise in elevation.
 - c. the contour interval is too small.
 - d. the slope is very steep.
8. On a geologic map, different colors indicate
- a. different elevations.
 - b. different rock types.
 - c. different structural features, such as faults and folds./
 - d. landscapes above and below sea level.

True or False

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

- _____ 9. A feature would appear bigger on a map with a scale of 1:24,000 than on one with a scale of 1:100,000?
- _____ 10. The distance between contour lines does not always need to be equal
- _____ 11. If you walk along a contour line you will be walking uphill.
- _____ 12. A contour line must close on itself.
- _____ 13. Steep contour lines indicate water.
- _____ 14. A relief map uses contour lines to show elevation.
- _____ 15. A contour line connects points of equal elevation.
- _____ 16. On a bathymetric map, the 200 meter contour is below the 300 meter contour.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

17. Oceanographers use _____ maps to depict the features beneath a body of water.
18. _____ can never cross with another on a topographic map.
19. The geologist was busy making a _____ that showed the location of the rock layers within the county.
20. The difference in elevation between contour lines is called the _____ .
21. Contour lines that are very close together indicate _____ slopes
22. Contour lines _____ cross.

Short Answer

Answer each question in the space provided.

23. Would a topographic map of the Sierra Nevada mountain range have contour lines that are close together or far apart in most places? Explain.

24. Why can't two contour lines overlap?

25. Describe what a geologic map shows.

26. Compare and contrast the contour lines in a bathymetric map and a topographic map.

Answer Key

1. b 2. a 3. c 4. d 5. c 6. d 7. a 8. b

9. true 10. true 11. false 12. true 13. false 14. true 15. true 16. true

17. bathymetric 18. contour line 19. geologic map 20. contour interval 21. steep 22. never

23. A mountain range is steep, and the Sierra Nevada is very steep in spots. Contour lines are close together where elevation changes rapidly so a contour map of the Sierra Nevada would have the lines close together.

24. A single point has a single elevation and a slope cannot be simultaneously be going up and down.

25. A geologic maps shows different rock types. It also shows geologic features such as folds and faults.

26. In a bathymetric map, the elevations represented by the contour lines increase with respect to depth below sea level. The lines of a topographic map increase with respect to height above sea level. But in both cases a contour line indicates a single elevation. }

2.5 Using Satellites and Computers

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. GPS stands for
 - a. Glacial Positioning System
 - b. Global Positioning Satellites
 - c. Global Positioning System
 - d. Global Placement System
2. What does GIS stand for?
 - a. Geographic Initiating Service
 - b. Geographic Information System
 - c. Geologic Igneous Sedimentary
 - d. Gravitational Incline Slope
3. What government organization is in charge of launching satellites?
 - a. CIA
 - b. FAA
 - c. NASA
 - d. ATF
4. A satellite in a polar orbit
 - a. is excellent for observing and predicting weather.
 - b. stays in the sky over the same spot.
 - c. makes one complete orbit around Earth about every 24 hours.
 - d. orbits at a distance of more than 30,000 km.
5. A satellite in a geostationary orbit
 - a. stays in the sky over the same spot.
 - b. makes one complete orbit around Earth about every 90 minutes.
 - c. is best for observing the polar regions.
 - d. is not as good for communications as satellites in other types of orbits.
6. GPS was developed to
 - a. assist with scientific investigations.
 - b. provide detailed information on maps.
 - c. aid in the development of computer software.
 - d. assist with the military.
7. GIS
 - a. was invented so that scientists could create better geological maps.

- b. is used to create maps containing any sort of spatial information.
- c. needs six satellites to accurately determine a position.
- d. is important for creating weather maps.

8. Maps made by computers

- a. are indistinguishable from those made by mapmakers.
- b. are made directly from satellite images with no processing.
- c. contain the same amount of information as maps that are created without computers.
- d. are very important for creating images from other planets.

9. Satellites can be used to

- a. get a snapshot of what Earth is like right now.
- b. study the way Earth changes over time.
- c. learn about other planets.
- d. all of the above.

10. GPS is

- a. an example of a technology developed by the government that is now used in the public sphere.
- b. most useful within 50 degrees north and south of the equator.
- c. best in urban areas and of much less use in remote locations.
- d. a communication between a locator satellite and a receiver on the ground.

True or False

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

- _____ 11. Satellites can determine the height of the ocean.
- _____ 12. A satellite orbits at 3,600 km above Earth in a geostationary orbit.
- _____ 13. GPS needs at least six satellites to accurately determine a position.
- _____ 14. All but one of Earth's satellites are man-made.
- _____ 15. In a geostationary orbit, the satellite orbits the Earth every 90 minutes

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. A _____ orbit is when the satellite is in sync with the rotation of the Earth.
17. Any object in orbit around another is considered a _____
18. A satellite in a _____ orbit can see Earth's entire surface in less than a day.
19. A GPS receiver uses at least _____ satellites.
20. To create a map with detailed information on fossil fuel use, a scientist would need to utilize _____.

Short Answer

Answer each question in the space provided.

21. What is GPS? What is its purpose?

22. Describe how GPS works.

23. Discuss two reasons why studying Earth by satellite so important.

24. Describe the types of scientific data that satellites can collect.

25. Describe the motion of a satellite in a geostationary orbit relative to a spot on Earth and why this is the case.

Answer Key

1. c 2. b 3. c 4. a 5. a 6. d 7. b 8. d 9. d 10. a

11. true 12. false 13. false 14. true 15. false

16. geostationary 17. satellite 18. polar 19. four 20. GIS

21. GPS is the Global Positioning System. It allows users to know where they are precisely when they are carrying a receiver.

22. A GPS receiver detects radio signals from at least four GPS satellites. There are precise clocks on the receiver and on each satellite. The receiver measures the time it takes for a radio signal to get from the satellite to it and then calculates the distance between them. The receiver triangulates using the data from each of the four or more satellites.

23. Satellites allow us to see the big picture. For example, weather predictions are much better when the atmosphere can be viewed from above. Satellites us to learn how Earth is changing over time. For example, the amount of Arctic sea ice each September is decreasing, something that can be seen from satellite viewing each year.

24. Satellites can monitor the weather and measure temperatures of land and oceans. They can monitor the amounts of gases in the atmosphere, the ability of the surface to reflect or absorb light, determine the height of the sea surface, watch global change, relay data back to Earth and many other things.

25. A satellite in a geostationary orbit hangs above one spot on the planet since the satellite takes 24 hours to complete one orbit and Earth completes one rotation. }

2.6 Studying Earth's Surface

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What do constructive forces do?
 - a. cause landforms to wear down.
 - b. create streams
 - c. create faults.
 - d. cause landforms to build up.
2. How old are ocean basins?
 - a. less than 90 million years.
 - b. less than 180 million years.
 - c. more than 240 million years.
 - d. more than 360 million years.
3. What device aligns itself with magnetic north and can be used to find direction?
 - a. a satellite.
 - b. a compass rose.
 - c. a compass.
 - d. none of the above.
4. Which lines start at the equator and circle around the planet?
 - a. longitude.
 - b. elevation.
 - c. relief
 - d. latitude.
5. What is a 2-D visual representation of a surface with symbols indicating important features?
 - a. a globe.
 - b. a map.
 - c. a projection.
 - d. all of the above.
6. Where is the Mercator Projection most accurate?
 - a. near the poles.
 - b. at the oceans.
 - c. along the edges.
 - d. near the equator.
7. Which projection does the National Geographic Society use?
 - a. Winkel Tripel Projection

- b. Robinson Projection
 - c. Conic Projection
 - d. Mercator Projection
8. What type of map represents locations of geographic features?
- a. bathymetric.
 - b. geologic.
 - c. topographic.
 - d. all the above.
9. What is the average height of the ocean's surface called?
- a. elevation.
 - b. sea level.
 - c. relief.
 - d. none of the above.
10. What type of orbit is a satellite in, if it is 36,000 km above the earth and takes 24 hours to complete one orbit?
- a. geostationary
 - b. polar
 - c. low earth
 - d. none of the above.

True or False

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

- _____ 11. The continents are large land areas extending from high mountain tops to sea level.
- _____ 12. The continental margins extend from edge of the continents down steep slopes to the ocean floor and into deep trenches.
- _____ 13. The deepest place in the oceans are the ocean trenches.
- _____ 14. Locations can be described a variety of ways.
- _____ 15. Direction is important for describing moving objects.
- _____ 16. Earth's magnetic north pole is the same as its geographic North Pole.
- _____ 17. The Prime Meridian is at 180° longitude.
- _____ 18. Relief includes all of the geographic features or landforms in a region.
- _____ 19. Earth is best represented by a Mercator Map.
- _____ 20. Conic projections are only useful for large land areas.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. _____ maps use color to show elevations of larger areas.
22. _____ maps show average temperature and rainfall.
23. _____ maps show storms, air masses, and fronts.
24. The poles are often mapped using the _____ projection.
25. The difference between contour lines is called the _____.
26. A(n) _____ map is a topographic map with the contour lines representing depth below sea level.
27. A(n) _____ map shows the rocks and structural features of a region.

28. A(n) _____ is a small object that orbits a larger object.
29. Weather satellites are examples of satellite in a _____ orbit.
30. _____ uses exact geographic locations for GPS receivers along with any type of spatial information to create maps and images.

Short Answer

Answer each question in the space provided.

31. Explain how hills and depressions are depicted on a topographic map.

32. Explain the importance of latitude, longitude, and elevation.

Answer Key

1. a 2. b 3. c 4. d 5. b 6. d 7. a 8. d 9. b 10. b
11. true 12. false 13. true 14. true 15. true 16. false 17. false 18. true 19. false 20. false
21. relief 22. climate 23. weather 24. gnomonic 25. contour intervals 26. bathymetric 27. geologic 28. satellite 29. polar 30. GIS (geographic information systems)
31. Concentric circles indicate a hill. Hatched concentric circles, with the hatches pointing inward, indicate a depression.
32. Latitude tells north and south of the equator. Longitude tells the location east or west of the prime meridian. Earth is not flat so elevation is important in order determine an accurate location in the 3rd dimension. Locations in three dimensions are important for accurate knowledge of where things or people are. }

CHAPTER

3

HS Earth's Minerals Assessments

Chapter Outline

- 3.1** **MATTER MATTERS**
 - 3.2** **MINERALS AND MINERAL GROUPS**
 - 3.3** **MINERAL IDENTIFICATION**
 - 3.4** **MINERAL FORMATION**
 - 3.5** **MINING AND MINERAL USE**
 - 3.6** **STUDYING EARTH'S MINERALS**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

3.1 Matter Matters

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. How many oxygen atoms are in a silicon-oxygen tetrahedron?
 - a. 2
 - b. 3
 - c. 4
 - d. 5
2. What is the lightest of all the elements?
 - a. hydrogen
 - b. helium
 - c. neon
 - d. carbon
3. What particles make up the nucleus of an atom?
 - a. protons only
 - b. neutrons only
 - c. neutrons and electrons
 - d. protons and neutrons
4. Which is not an element?
 - a. hydrogen
 - b. water
 - c. argon
 - d. uranium
5. Which is the average of the mass numbers of an element's isotopes?
 - a. atomic number
 - b. energy levels
 - c. atomic mass
 - d. molecular mass
6. Electrons are
 - a. important components of an atomic nucleus.
 - b. the main reason the atomic mass of different atoms is different.
 - c. the main reason an element may have different isotopes.
 - d. found in a cloud.
7. Carbon atoms
 - a. have 6 protons and 6, 7 or 8 neutrons

- b. have 6 neutrons and 6, 7 or 8 protons.
 - c. have 6 neutrons and 6, 7 or 8 electrons.
 - d. have 6 protons and 6 neutrons.
8. To create a positive ion from a negative ion, there must be
- a. a loss of at least two electrons.
 - b. a gain of at least two electrons.
 - c. the addition of protons in the nucleus.
 - d. the addition of neutrons in the nucleus.
9. With a polar molecule,
- a. the substance is always cold enough to be in the solid state.
 - b. an atom shares one or more electrons with another atom.
 - c. the electrical charges are always equal.
 - d. one side has a slightly positive charge and the other has a slightly negative charge.
10. With a hydrogen bond,
- a. a hydrogen atom is bonded to another hydrogen atom, possibly with another atom; as in water.
 - b. the positive side of one polar molecule is attracted to the negative side of another polar molecule.
 - c. electrons are transferred between atoms.
 - d. an atom shares one or more electrons with another atom.

True or False

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

- _____ 11. Protons have a positive electrical charge.
- _____ 12. The number of protons plus neutrons gives the atom its atomic mass
- _____ 13. When an atom either gains or loses electrons, this creates an molecule.
- _____ 14. A covalent bond is the weakest of all chemical bonds
- _____ 15. Electrons are always negatively charged

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. A _____ is formed when atoms share electrons.
17. An atom can give or receive electrons in a(n) _____.
18. An atom with more or less neutrons than protons is a(n) _____.
19. Electrons, protons and neutrons make up an _____.
20. The part of an atom that is positively charged is called the _____.
21. Neon has eight _____ in its outer valence shell.
22. The _____ of water is 18.01528 amu.
23. A chemical _____ is a substance that cannot be made into a simpler form by ordinary chemical means.

Short Answer

Answer each question in the space provided.

24. When is an atom considered stable?

25. How is an atom different from an ion? Why are ions important?

26. What type of chemical bond keeps two water molecules bonded together? Explain how this type of bonding works.

Answer Key

1. c 2. a 3. d 4. b 5. c 6. d 7. a 8. b 9. d 10. b

11. true 12. true 13. false 14. false 15. true

16. covalent bond 17. ionic bond 18. isotope 19. atom 20. nucleus 21. electrons 22. molecular mass 23. element

24. An atom is considered stable when it has a full outermost electron valence shell.

25. An ion is an atom that either gains or gives an electron. Because ions can share or give electrons, they can bond to make molecules.

26. Hydrogen bonds occur because some molecules are polar molecules. The best known is the water molecule, which is slightly negative on one side, due to the presence of two oxygen ions, and slightly positive on the other side,

due to the presence of a hydrogen ion. The positive side of one water is attracted to the negative side of another, which is attracted to the positive side of a third, and so on. Hydrogen bonds are weak but are important. }

3.2 Minerals and Mineral Groups

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A crystal is a solid in which the atoms are arranged in a _____, _____ pattern
 - a. regular, non-repeating
 - b. irregular, repeating
 - c. regular, repeating
 - d. irregular, non-repeating
2. About how many minerals are found in the Earth's crust?
 - a. 2000
 - b. 3000
 - c. 4000
 - d. 5000
3. Silicates make up over ____ of the Earth's crust.
 - a. 95%
 - b. 90%
 - c. 50%
 - d. 45%
4. The chemical composition of hematite is
 - a. Fe_2O_3
 - b. Fe_3O_2
 - c. $\text{Fe}_2\text{O}_3\text{C}$
 - d. H_2O_3
5. The most magnetic mineral is?
 - a. hematite
 - b. magnetite
 - c. halite
 - d. uranium
6. The elements that make up 98.5% of Earth's crust are
 - a. gold, silver, copper, titanium, and the other metals.
 - b. oxygen and silicon
 - c. oxygen, silicon, gold, silver, copper, titanium, and aluminum
 - d. oxygen, silicon, aluminum, iron, calcium, sodium, potassium, and magnesium
7. The two most abundant elements in common minerals are?
 - a. calcium manganese

- b. silicon oxygen
 - c. iron magnesium
 - d. carbon potassium
8. Which of the following is a part of the definition of a mineral?
- a. liquid
 - b. condition
 - c. inorganic
 - d. organic
9. The pattern in which a mineral breaks is called
- a. cracking
 - b. strike
 - c. breaking
 - d. fracture
10. The different appearances of different types of silicates are due to the different
- a. ways the tetrahedrons combine together.
 - b. conditions in which the minerals form.
 - c. chemical compositions, such as the presence or absence of silica.
 - d. shapes of the tetrahedrons.
11. Fluorine, chlorine, bromine and iodine are found in
- a. halide minerals.
 - b. phosphate minerals.
 - c. sulfide minerals
 - d. oxygenate minerals.
12. Phosphate minerals are like silicates except that
- a. phosphorous substitutes for oxygen.
 - b. phosphorous, arsenic or vanadium substitutes for oxygen.
 - c. phosphorous substitutes for silicon.
 - d. phosphorous, arsenic or vanadium substitutes for silicon.

True or False

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

- _____ 13. Most minerals are native elements
- _____ 14. Minerals are crystalline structures
- _____ 15. Most minerals fit into one of two mineral groups.
- _____ 16. Silicates are by far the largest mineral group.
- _____ 17. Table salt is also known as halite.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The crystalline structure of halite (table salt) creates minerals in the shape of _____.
19. A mineral is a naturally occurring, _____ substance with a repeating crystalline structure.
20. Minerals are divided into groups based on their _____.
21. Minerals are made by _____ processes
22. Minerals with only one element are called _____.

23. Minerals that form when salt water evaporates are _____.
24. The element _____ is found in sulfates but not sulfides.
25. The way light reflects off the mineral's surface is called _____.

Short Answer

Answer each question in the space provided.

26. Is quartz a mineral? Is glass a mineral? Describe why in each case.

27. What is the basic structure of a carbonate? What makes different carbonates?

28. What are the requirements for a substance to be a mineral?

Answer Key

1. c 2. c 3. b 4. a 5. b 6. d 7. b 8. c 9. d 10. a 11. a 12. d
13. false 14. true 15. false 16. true 17. true

18. a cube 19. inorganic 20. chemical composition 21. natural 22. native elements 23. evaporites 24. oxygen 25. luster

26. Quartz is a mineral because it meets the definition of a mineral including having a crystal structure. Glass is not a mineral because it does not have a crystalline structure.

27. Carbonate is one carbon atom bonded to three oxygen atoms. Different carbonate minerals have different additional elements included, such as calcium, iron or copper.

28. It must be a naturally occurring, inorganic, crystalline solid that has a characteristic chemical composition and crystal structure. }

3.3 Mineral Identification

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A glassy appearing mineral would have a luster that is
 - a. silky
 - b. pearly
 - c. vitreous
 - d. earthy
2. A mineral that splits into even sheets shows which of the following properties?
 - a. low density
 - b. consistent streak
 - c. good cleavage
 - d. triclinic crystal shape
3. Color variety in minerals is caused by
 - a. chemical impurities
 - b. change in temperature
 - c. the number of crystals
 - d. the crystalline structure
4. Diamond has which of the following types of luster?
 - a. metallic
 - b. adamantine
 - c. glassy
 - d. pearly
5. A mineral has a mass of 240 grams and a volume of 60 cubic centimeters. What is its density?
 - a. 14400g/cm^3
 - b. 4g/cm^3
 - c. 8g
 - d. $4\text{cm}^3/\text{g}$
6. What mineral fizzes when it comes in contact with hydrochloric acid?
 - a. quartz
 - b. pyrite
 - c. gypsum
 - d. calcite
7. What would you use the Mohs scale for?
 - a. to determine a mineral's hardness

- b. to find the mass of a mineral
 - c. to calculate the density of a mineral
 - d. to determine a mineral's fracture
8. When a mineral is rubbed across an unglazed porcelain plate. What mineral property is being tested?
- a. hardness
 - b. luster
 - c. color
 - d. streak
9. Minerals that exhibit fluorescence
- a. have a characteristic fluorite structure.
 - b. have a distinctive smell.
 - c. glow under ultraviolet light.
 - d. give off radiation that can be measured with a Geiger counter.
10. Minerals will break
- a. where their chemical bonds are weakest.
 - b. along flat planes.
 - c. in one direction.
 - d. in patterns such as fibrous, splintery, or smooth-curved.
11. Fluorite is
- a. harder than apatite but softer than calcite.
 - b. harder than gypsum but softer than apatite.
 - c. harder than calcite but softer than feldspar.
 - d. harder than feldspar but softer than apatite.
12. A mineral with vitreous luster looks
- a. pearly.
 - b. glassy.
 - c. resinous.
 - d. none of the above.

True or False

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

- _____ 13. The same mineral can have different shapes.
- _____ 14. Corundum can scratch topaz but will be scratched by diamond.
- _____ 15. Many minerals are colored by chemical impurities.
- _____ 16. Color is a more reliable property than streak because color does not vary.
- _____ 17. Fracture is a break in a mineral along certain planes.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A mineral that does not break smoothly along cleavage planes is said to _____.
19. Any object with a _____ greater than water will sink in water.
20. The reflection of light off a mineral's surface is its _____.
21. _____ is the color of a mineral's powder.
22. The heft or relative weight of a mineral sample is directly related to the mineral's _____.

23. Scientists who study minerals are known as _____.
24. The amount of matter in an object is its _____.
25. A mineral that has luster like tree sap has _____ luster.

Short Answer

Answer each question in the space provided'

26. Imagine you have in your hand a mineral that you think is quartz. What characteristics would allow you to prove or disprove this initial identification? What characteristics could you not use?

27. Describe three characteristics that will let you determine if a mineral is pyrite or gold.

Answer Key

1. c 2. c 3. a 4. b 5. b 6. d 7. a 8. d 9. c 10. a 11. d 12. b
13. true 14. true 15. true 16. false 17. false
18. fracture 19. density 20. luster 21. Streak 22. density 23. mineralogists 24. mass 25. resinous
26. Quartz comes in many colors so that is not a good trait to use for identification. Quartz does not have streak. Quartz has a glassy or vitreous luster, and it fractures in smooth curved arcs. Most importantly quartz has a hardness of 7 so it can scratch feldspar but will be scratched by topaz.
27. Pyrite has a black streak, gold has a golden yellow streak. Gold has much higher density than pyrite. Pyrite has characteristic striations, while gold does not. }

3.4 Mineral Formation

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Magma begins to crystallize below
 - a. 2,000°C
 - b. 1,100°C
 - c. 1,100°F
 - d. 2,000°F
2. What happens to the crystals that form from a magma that cools at a slower rate?
 - a. crystal size increases
 - b. crystal size decreases
 - c. crystals become clearer
 - d. crystals become darker in color
3. Which is not a method of mineral formation?
 - a. volcanic gases
 - b. oxidation
 - c. sedimentation from magma
 - d. deposition from a saline fluid
4. Whether a magma cools slowly or rapidly, the resulting rocks will
 - a. have the same chemical composition.
 - b. have the same crystal size.
 - c. have the same minerals.
 - d. be granite (slow cooling) or basalt (rapid cooling).
5. Minerals form from salt water when
 - a. the water is heated to a certain temperature, depending on the mineral.
 - b. the amount of dissolved material becomes too great and the particles come together.
 - c. the water finds a vein to travel through and deposit particles.
 - d. the water becomes more acidic and minerals precipitate out.
6. New minerals can form from old minerals in a rock when
 - a. the rock is heated enough that the molecules are released from their structures.
 - b. the magma cools very rapidly.
 - c. evaporation brings chemical elements together to form the minerals.
 - d. the magma cools very slowly.
7. Tufa towers are
 - a. piles of bat guano.

- b. mineral deposits that form as magma cools in a dome-shape.
 - c. found in clear lakes, such as Lake Tahoe in California.
 - d. carbonate structures that form from an alkaline lake.
8. Minerals form from
- a. solids.
 - b. liquids.
 - c. gases.
 - d. all of the above.
9. In a granite, minerals can be distinguished by their
- a. size.
 - b. shape.
 - c. color.
 - d. location.
10. The size of a space that a mineral can form in can determine its
- a. composition.
 - b. color.
 - c. luster.
 - d. size.

True or False

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

- _____ 11. If a rock heats up just enough that the molecules can move around, the rock has become a magma.
- _____ 12. There are about 14 conditions that a mineral can form under.
- _____ 13. Water can only hold a certain amount of dissolved minerals.
- _____ 14. Veins are mineral deposits that fill in cracks.
- _____ 15. Any mineral can precipitate from water under the right conditions.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. You are holding in your hand a rock that formed from magma. If that rock has tiny crystals, you can say that the rock cooled _____.
17. You are holding in your hand a rock that formed from magma. If that rock has large crystals, you can say that the rock cooled _____.
18. An extremely large body of water containing a solution of chemical elements that can become minerals is called a(n) _____.
19. Kilauea, the most active volcano on Earth, erupts a tremendous amount of _____ annually.
20. A rock is a collection of _____.
21. The slower magma cools, the larger _____ the minerals will form.
22. A rock that contains large crystals of quartz, plagioclase feldspar, potassium feldspar and biotite is called _____.
23. Tufa towers form when spring water that is rich in the element _____ bubbles up into an alkaline lake.

Short Answer

Answer each question in the space provided.

24. Describe the entire process that creates mineral deposits in veins.

25. What happens to the dissolved minerals when water evaporates?

Answer Key

1. b 2. a 3. c 4. a 5. b 6. a 7. d 8. d 9. c 10. d

11. false 12. false 13. true 14. true 15. false

16. rapidly 17. slowly 18. ocean or sea 19. lava 20. minerals 21. crystals 22. granite 23. calcite

24. Magma heats underground water. The hot water travels through veins in the rock and picks up dissolved particles. When the water cools, the particles form solid minerals. The minerals fill cracks in the rock that are called veins.

25. The dissolved chemicals get closer together. The chemicals form mineral solids. These minerals sink. The minerals precipitate out of the water. }

3.5 Mining and Mineral Use

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Placers are valuable minerals found in
 - a. mountain ranges
 - b. deserts
 - c. stream deposits
 - d. populated areas
2. An ore will be mined if it is
 - a. easy
 - b. profitable
 - c. harmful
 - d. difficult
3. Overlying rock is blasted away in which type of mining
 - a. underground mining
 - b. surface mining
 - c. oceanic mining
 - d. panning
4. Gold that weathered out of metamorphic rock in California
 - a. was located below the soil surface.
 - b. was located at the soil surface.
 - c. settled in gravel deposits.
 - d. none of the above.
5. Underground mining approaches depend on
 - a. the placement of the ore
 - b. concentration of the ore
 - c. strength of the surrounding rock
 - d. all of the above
6. The cost of creating a product from a mineral deposit depends on
 - a. the abundance of the valuable mineral in the deposit.
 - b. the cost of extracting the mineral from the rock.
 - c. the cost of refining the ore material.
 - d. all of the above.
7. If the price of a mineral resource goes up,
 - a. a rock that was not an ore deposit could become an ore deposit.

- b. the value of the ore deposit will go down.
 - c. the price of mining that resource will go up.
 - d. it will be mined.
8. Valuable natural resources are
- a. evenly distributed around the planet.
 - b. more highly concentrated in certain locations by geologic processes.
 - c. collected by surface mining techniques.
 - d. always profitable, or they wouldn't be called valuable.
9. Smelting
- a. is a type of surface mining in which the overlying rock is blasted away.
 - b. is a type of underground mining in which miners blast and tunnel into rock to gain access to the ore deposit.
 - c. causes minerals to segregate so that the valuable ore can be extracted.
 - d. is when a compound is added that attaches to the valuable mineral, which floats and can then be extracted.
10. Examples of gemstones include all of the following except
- a. diamonds
 - b. cubic zirconia
 - c. turquoise
 - d. jade
11. Which of the following is not true of gemstones?
- a. Gemstones are valuable.
 - b. Gemstones are cut so that light bounces back off the cleavage planes.
 - c. Gemstones do not break or scratch easily.
 - d. Gemstones are only used in jewelry.
12. Which of the following is not a use for minerals?
- a. providing energy
 - b. electrical wiring
 - c. adding flavor to food
 - d. creating food containers

True or False

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

- _____ 13. Environmental factors are usually considered in the cost of an ore.
- _____ 14. There is much more to the process of ore extraction beyond mining
- _____ 15. Pollutants from mining can enter nearby streams
- _____ 16. There are currently no laws that say a mine must return the surrounding environment back to its natural state.
- _____ 17. Gemstones are primarily used for jewelry.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A(n) _____ is a rock from which metals or nonmetals can be removed in usable amounts.
19. In order for a mine to open, a _____ plan must be in place for when the mine closes down.
20. Surface mining allows extraction of ores that are _____ to the Earth's surface

21. A(n) _____ that is used for jewelery is usually cut and polished.
22. Bauxite is a rock that contains valuable amounts of the resource _____.
23. Strip mining, placer mining and dredging are examples of _____ mining.
24. Coal miners that work in tunnels are engaging in _____ mining.
25. The use of chemicals, such as cyanide or acid, to remove ore minerals from rock is called _____.

Short Answer

Answer each question in the space provided.

26. What are some of the environmental side effects of mining?

27. Describe the process of reclamation.

28. How do geologists find mineral deposits and determine their size?

29. Why is it better to recycle aluminum rather than create new aluminum?

Answer Key

1. c 2. b 3. b 4. c 5. d 6. d 7. a 8. b 9. c 10. b 11. d 12. a

13. false 14. true 15. true 16. false 17. false

18. ore 19. reclamation 20. close 21. gemstone 22. aluminum 23. surface 24. underground 25. heap leaching

26. Mining can clear the landscape of vegetation and pollutants can enter the surrounding environment.

27. Reclamation means that a region that has been mined must be restored to its natural state. The ground must be contoured to match its natural contours. Vegetation must be planted. Mines must be sealed off or made into bat caves.

28. Geologists study geological formations and soil. They sample rocks from likely locations and test their chemistry and physical properties. They use this information to determine the size and value of a mineral deposit.

29. Extracting aluminum from ore is extremely energy intensive. If you recycle just 40 aluminum cans you will save the equivalent of one gallon of gasoline. }

3.6 Studying Earth's Minerals

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What subatomic particles make up the atomic mass of an element?
 - a. protons and neutrons.
 - b. electrons and neutrons.
 - c. protons and electrons.
 - d. protons, neutrons, and electrons.
2. What type of bond is created when electrons are transferred between atoms?
 - a. hydrogen.
 - b. ionic.
 - c. covalent.
 - d. metallic.
3. Minerals have
 - a. an exact chemical composition, such as SiO_2 .
 - b. a small range in chemical composition, such as $(\text{Mg, Fe})_2\text{SiO}_4$
 - c. a large range in chemical composition, such as $(\text{Mg, Fe, Al, K, Na})_2\text{SiO}_4$
 - d. no set chemical composition.
4. Each mineral group has a distinctive chemical feature, such as
 - a. oxides are a metal combined with oxygen.
 - b. sulfides are a metal combined with sulfur and oxygen.
 - c. halides are a salt combined with a metallic atom.
 - d. phosphates are made of phosphate polygons.
5. The specific gravity of a mineral
 - a. is a measure of its density, mass divided by volume.
 - b. is a measure of its mass, the amount of matter in the mineral.
 - c. compares its density to the density of water.
 - d. compares its gravity to the gravity of water.
6. Streak is a more reliable property for identifying a mineral than color because
 - a. all minerals have streak.
 - b. mineral colors vary, but their streak color does not.
 - c. a minerals color can change over time, but it's streak color does not.
 - d. streak and color are nearly always the same.
7. If a rock is heated below the surface to more than $1,000^\circ\text{C}$ it will
 - a. form a metamorphic rock.

- b. create a magma.
 - c. heat underground water to form vein deposits.
 - d. form geodes if there is space to do so.
8. If pure water is evaporated, what is left behind is
- a. calcium carbonate, like in tufa towers.
 - b. only the mineral halite.
 - c. the minerals halite, gypsum and other evaporites.
 - d. nothing.
9. Recycling an aluminum can
- a. is not very valuable because aluminum is cheap.
 - b. is extremely energy intensive.
 - c. uses much less energy than creating useful aluminum from ore.
 - d. is something other people should do.
10. The environmental costs of mining
- a. are minimal.
 - b. potentially include pollutants entering streams and the soil.
 - c. excess sediments clogging streams and lakes.
 - d. b c

True or False

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

- _____ 11. Carbon-12, carbon-13 and carbon-14 are all isotopes of the same element.
- _____ 12. Covalent bonding keeps a water molecule together, but polar bonding keeps water molecules attached to each other.
- _____ 13. Minerals that are the same color probably have the same color streak.
- _____ 14. The minerals groups are sulfides, sulfates, phosphates, oxates, halides, carbonates, native elements and silicates.
- _____ 15. Some minerals have a distinctive taste or smell.
- _____ 16. Gemstones have cleavage planes that are in a crystal shape with smooth faces.
- _____ 17. Molten rock, wherever it is, is called magma.
- _____ 18. Vein deposits are mineral deposits that form when minerals fill cracks in rocks.
- _____ 19. Ore is a rock that contains minerals with useful elements.
- _____ 20. Toxic chemicals are sometimes put on rock to remove the ore.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. The smallest unit of a compound with all of the properties of that compound is a(n) _____.
22. The sum of all the masses of all the atoms in a molecule is its _____.
23. Atoms are arranged in regular, repeating patterns in a(n) _____.
24. The basic carbonate structure is _____ carbon atom(s) and _____ oxygen atom(s).
25. The property of a mineral that describes what minerals it can scratch or can be scratched by is its _____.
26. Some minerals give off _____ that can be measured with a Geiger counter.

27. When the amount of dissolved minerals and salts in water becomes too great, these materials will _____.
28. Crystals that form when magma cools _____ are larger than it cools rapidly.
29. The restoration of a mined region to its natural region is called _____.
30. Metal ores must undergo _____ so that the valuable minerals segregate into layers and can be extracted.

Short Answer

Answer each question in the space provided.

31. Describe how the building blocks of silicates create different shaped minerals.

32. Other than jewelry, what else are minerals used for? List at least 3 things.

33. Explain the difference between surface and underground mining.

Answer Key

1. a 2. c 3. b 4. a 5. d 6. b 7. b 8. d 9. c 10. d
11. true 12. true 13. false 14. false 15. true 16. false 17. false 18. true 19. true 20. true

21. molecule 22. molecular mass 23. crystal 24. one, three 25. hardness 26. radiation 27. precipitate 28. slowly 29. reclamation 30. smelting

31. The building blocks of silicates are silica tetrahedra. The silica tetrahedrons can combine together in six different ways to create six different types of silicates. The tetrahedrons can stand alone, form rings, link into single chains, link into double chains, form flat sheets, or make a 3-dimensional structure.

32. Cut or polish other materials, sandpaper, in sheetrock, making glass, used for rock salt, electrical wiring, and to make soda cans.

33. Surface mining strips the upper surface of the Earth to get to the minerals. Underground mining involves digging shafts and corridors underground to get to the minerals. Underground mining is more expensive and dangerous than surface mining. }

CHAPTER

4**HS Rocks Assessments****Chapter Outline**

- 4.1 TYPES OF ROCKS**
 - 4.2 IGNEOUS ROCKS**
 - 4.3 SEDIMENTARY ROCKS**
 - 4.4 METAMORPHIC ROCKS**
 - 4.5 STUDYING ROCKS**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

4.1 Types of Rocks

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. How many rock types are in the rock cycle?
 - a. 3
 - b. 4
 - c. 5
 - d. 7
2. Each type of rock has a particular
 - a. color.
 - b. size.
 - c. set of minerals.
 - d. shape.
3. The texture of a rock is determined by
 - a. the size of its mineral grains.
 - b. the shape of its mineral grains.
 - c. the arrangement of its mineral grains.
 - d. all of the above.
4. When magma cools and hardens, which of the following does it form?
 - a. Igneous rock
 - b. Sedimentary rock
 - c. Metamorphic rock
 - d. Conglomerate
5. The reason two rocks can have the same minerals but with very different sizes is
 - a. the fragments in one rock are more eroded than the fragments in the other.
 - b. the rocks cooled at different rates from a magma.
 - c. the rocks have different compositions.
 - d. one rock is igneous and one rock is metamorphic.
6. Sediments come together by these processes to create sedimentary rocks.
 - a. compaction and cementation
 - b. precipitation and cementation
 - c. compaction and precipitation
 - d. compaction, cementation, and precipitation
7. Weathering breaks rocks down into
 - a. minerals.

- b. crystals.
 - c. sediments.
 - d. rocklets.
8. Erosion is the process by which sediments
- a. are broken into smaller pieces.
 - b. are compacted into rock.
 - c. are changed into other types of sediments.
 - d. are transported by running water, ice and gravity.
9. A rock that changes its mineral composition or texture is a(n)
- a. igneous rock.
 - b. sedimentary rock.
 - c. metamorphic rock.
 - d. hard rock.
10. Quartzite forms when
- a. quartz sandstone melts to form a magma that then crystallizes.
 - b. quartz sandstone is exposed to heat and pressure within the planet.
 - c. quartz grains are cemented and compacted.
 - d. quartz grains precipitate from a quartz-rich fluid.

True or False

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

- _____ 11. As magma cools, all of the mineral grains form at the same temperature.
- _____ 12. Metamorphism may change the chemical composition of a rock.
- _____ 13. Only one type of mineral can be present in a metamorphic rock.
- _____ 14. Rocks can be studied through a microscope
- _____ 15. A metamorphic rock must have a different mineral composition than its parent rock

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The natural transitions that change one rock type to another rock type are part of the _____.
17. Igneous rocks form by the _____ of magma
18. One of the two things that rocks are identified primarily by is their _____.
19. The other of the two things that rocks are identified primarily by is their _____.
20. An exposed rock formation is called a(n)_____.
21. The solids that are left behind after a liquid evaporates are called _____.
22. Rocks that have formed from previously existing rocks through the actions of heat and pressure are _____ - _____ rocks.
23. The Grand Canyon was created by _____ by the Colorado River.

Short Answer

Answer each question in the space provided.

24. Describe the importance of the rock cycle.

25. What is the process that transforms a igneous rock into a sedimentary rock?

26. Draw a picture of the rock cycle with the three rock types and the processes that connect them. This will be useful as a reference in the rest of this chapter.

Answer Key

1. a 2. c 3. d 4. a 5. b 6. a 7. c 8. d 9. c 10. b

11. false 12. false 13. false 14. true 15. false

16. rock cycle 17. crystallization 18. minerals 19. texture 20. outcrop 21. precipitate 22. metamorphic 23. erosion

24. The rock cycle shows that any rock can become any other type of rock. It shows the processes that cause that to happen.

25. An igneous rock is weathered and eroded into sediments, the sediments are then cemented together over time into a sedimentary rock.

26. See the diagram in the chapter. }

4.2 Igneous Rocks

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. If only some minerals in a rock become liquid, the rock is undergoing
 - a. Bowen's Reaction Series.
 - b. fractional crystallization.
 - c. partial melting.
 - d. partial crystallization.
2. Which of the following is true?
 - a. Fractional crystallization is the opposite of partial melting.
 - b. Fractional crystallization takes place in more mafic rocks, while partial melting takes place in more felsic rocks.
 - c. Fractional crystallization takes place in more felsic rocks, while partial melting takes place in more mafic rocks.
 - d. Fractional crystallization is the same as partial melting.
3. If each of the minerals below appear in a rock, which was the first mineral to crystallize from the magma?
 - a. amphibole
 - b. olivine
 - c. biotite mica
 - d. pyroxene
4. What magma type contains the greatest amount of SiO_2 ?
 - a. rhyolitic magma
 - b. basaltic magma
 - c. andesitic magma
 - d. peridotitic magma
5. Which minerals are associated with the right branch of Bowen's reaction series?
 - a. olivine and pyroxene
 - b. mica and feldspars
 - c. feldspars
 - d. quartz and biotite
6. Which term describes igneous rocks that crystallize above the crust
 - a. extrusive
 - b. intrusive
 - c. magma
 - d. lava

7. Which mineral is the most common in ultramafic rock?
 - a. diamond
 - b. quartz
 - c. pyroxene
 - d. olivine
8. Which of the following affects the melting temperature of magma?
 - a. ore deposits
 - b. silica content
 - c. oxygen content
 - d. potassium content
9. A rock may melt to form a magma if
 - a. pressure is raised.
 - b. temperature is lowered.
 - c. water is added.
 - d. composition is changed.
10. A rock with the small, barely visible crystals of quartz and orthoclase feldspar is likely to be a
 - a. dacite
 - b. granodiorite
 - c. rhyolite
 - d. granite
11. If the silica content of an igneous rock with large, well-formed crystals is around 68%, the rock is a
 - a. dacite
 - b. granodiorite
 - c. rhyolite
 - d. granite
12. Igneous rocks are extremely common because they
 - a. are a large portion of the continents.
 - b. make up most of the seafloor.
 - c. are common in many mountain ranges.
 - d. all of the above.

True or False

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

- _____ 13. Temperature, pressure, water, and rock composition are factors that determine if a rock will melt.
- _____ 14. Bowen's Reaction Series can be used to determine the range of temperatures at which a mineral will crystallize.
- _____ 15. Diorite is a type of basalt.
- _____ 16. All magma has the same composition.
- _____ 17. Silicon is the most abundant element in the Earth's crust at 46.6%

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Andesite and diorite are in the _____ group of igneous rocks.
19. A rock body that forms from magma that cools in the crust is a(n) _____.

20. Peridotite and komatiite are types of _____ igneous rocks.
21. Quartz is the last mineral to crystallize from a magma according to _____.
22. If a lava cools so rapidly that gas is trapped in the rock, that rock will be of the type _____.
23. The rock described in the previous problem has _____ texture.
24. _____ igneous rocks form underground and cool more slowly, causing large crystals to form.
25. A rock is classified as _____ if it has low (but not super low) silica content.

Short Answer

Answer each question in the space provided.

26. Thinking of Bowen's Reaction Series in a general sense, which mineral will be the first to crystallize out of a magma?

27. Describe how a rock with porphyritic texture forms.

28. What are the differences between intrusive and extrusive igneous rocks in how they appear and how they form?

Answer Key

1. d 2. a 3. b 4. a 5. c 6. a 7. d 8. b 9. c 10. c 11. b 12. d

13. true 14. true 15. false 16. false 17. false

18. intermediate 19. pluton 20. ultramafic 21. Bowen's Reaction Series 22. pumice 23. vesicular 24. Extrusive 25. mafic

26. The first mineral will be the one that crystallizes at the highest temperature. The exact mineral depends on the composition of the magma. If the magma is mafic, olivine will be the first. If the composition is more felsic, the first will be further down the left arrow.

27. A rock with porphyritic texture is volcanic. Crystals formed as the magma was cooling in the magma chamber. Then the magma erupted and so the rest of the magma cooled rapidly.

28. An intrusive igneous rock cools and crystallizes underneath the surface and an extrusive igneous rock cools and crystallizes above the surface. Intrusive rocks cool slower and have larger crystals than extrusive rocks. }

4.3 Sedimentary Rocks

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. By what process are surface materials removed and transported from one location to another?
 - a. weathering
 - b. deposition
 - c. transportation
 - d. erosion
2. What are solid particles that have been deposited on the Earth's surface called?
 - a. lava
 - b. sediments
 - c. quartz
 - d. soils
3. What do rock salt, gypsum and dolostone have in common?
 - a. They are all clastic sedimentary rocks.
 - b. They are all chemical precipitates.
 - c. They are all biochemical sedimentary rocks.
 - d. They are all organic.
4. What process breaks solid rock into smaller pieces?
 - a. weathering
 - b. deposition
 - c. cementation
 - d. metamorphism
5. What type of erosion can usually only moved sand or or small sized particles?
 - a. glaciers
 - b. water
 - c. landslides
 - d. wind
6. Which of the following is the sedimentary rock with the smallest grains?
 - a. breccia
 - b. conglomerate
 - c. siltstone
 - d. sandstone
7. Large piles of large sediments could have been transported by
 - a. streams

- b. wind
 - c. ocean currents
 - d. glaciers
8. The sizes of the sediments a stream can carry depends primarily on
- a. the energy of the water.
 - b. the roundness of the sediments.
 - c. the composition of the sediments.
 - d. the amount of sediments that are available.
9. The way sediments harden into rock is best described as
- a. compaction.
 - b. lithification.
 - c. cementation.
 - d. precipitation.
10. Compaction occurs when
- a. fluids fill the spaces between sediments and crystallize.
 - b. sediments are squeezed by the weight of overlying sediments.
 - c. chemical sediments precipitate into the clastic sediments.
 - d. fossils fill in the spaces between sediments.
11. Clastic sedimentary rocks are classified by
- a. the presence or absence of biological materials.
 - b. how highly lithified they are.
 - c. the size of the sediments they are made of.
 - d. the location where they precipitated.
12. Rocks that form from the shells of dead organisms are best described as
- a. biochemical sedimentary rocks.
 - b. chemical sedimentary rocks.
 - c. fossil rocks.
 - d. biological sandstone.

True or False

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

- _____ 13. Like minerals, sediments cannot include organic materials.
- _____ 14. Weathering and erosion are terms that mean different things.
- _____ 15. Lithification is the process that breaks rocks into smaller fragments.
- _____ 16. Cementation occurs when the fluids in the free spaces of the sediments crystallize.
- _____ 17. A biochemical sedimentary rock can form directly from water.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. _____ sedimentary rocks are rocks that form when chemical precipitates harden.
19. As sediments are buried underneath newer sediments, weight causes _____ to occur
20. Loose sediments harden by process of _____ where fluids deposit ions.
21. The process of sediments becoming squeezed into rocks is called _____.

22. A breccia is like a _____ except that a breccia has angular fragments and the other rock has rounded fragments.
23. The sedimentary rock made of the smallest sediments is called _____.
24. If one rock layer is below another rock layer, the rock layer on top is very likely to be _____ in age.
25. The mineral that was called a mineral in the previous chapter and is a sedimentary rock in this chapter is _____.

Short Answer

Answer each question in the space provided.

26. Describe how sedimentary rocks are classified.

27. What are some uses of sedimentary rocks?

Answer Key

1. d 2. b 3. b 4. a 5. d 6. c 7. d 8. a 9. b 10. b 11. c 12. a
13. false 14. true 15. false 16. true 17. false
18. chemical sedimentary rocks 19. compaction 20. cementation 22. conglomerate 23. shale 24. younger 25. halite
26. First sedimentary rocks are separated into clastic and chemical. Clastic rocks are classified based on the size of their sediments. Conglomerates and breccias have large fragments that are rounded or angular, respectively. Chemical sedimentary rocks include biochemical rocks that were created by a living creature.
27. Sedimentary rocks are used construction as building stones. They are broken into sand and gravel to make rock piles (like beneath railroad tracks) or to make concrete or asphalt. }

4.4 Metamorphic Rocks

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Metamorphism occurs when there is
 - a. heat only.
 - b. pressure only.
 - c. heat and pressure together.
 - d. all of the above.
2. Metamorphic rocks change
 - a. physically only.
 - b. chemically only.
 - c. physically and chemically together.
 - d. all of the above.
3. Contact metamorphism is caused by
 - a. heat from magma
 - b. water pressure
 - c. overlying rock
 - d. atmospheric pressure
4. Ground up marble is commonly found in
 - a. plastics
 - b. paper
 - c. toothpaste
 - d. all of the above
5. Marble is a metamorphosed rock of
 - a. sandstone
 - b. limestone
 - c. quartz
 - d. shale
6. Regional metamorphism is due to extreme pressure caused by
 - a. heat from magma
 - b. water pressure
 - c. overlying rock
 - d. atmospheric pressure
7. What type of rock can become a metamorphic rock?
 - a. Igneous rock

- b. Sedimentary rock
 - c. Metamorphic rock
 - d. all of the above
8. Which of the following is classified as a metamorphic rock?
- a. conglomerate
 - b. phyllite
 - c. shale
 - d. breccia
9. Metamorphism changes rocks because
- a. the minerals need to be stable under the new conditions.
 - b. the rocks melt.
 - c. the conditions break the atoms apart to form new atoms.
 - d. the pressure causes foliation in each mineral.
10. Regional metamorphism can be the result of
- a. extreme heat.
 - b. deep burial.
 - c. intense pressure from all directions.
 - d. melting.
11. Increasing metamorphism of shale will lead to
- a. gneiss then schist then phyllite then slate.
 - b. slate then phyllite then schist then gneiss.
 - c. schist then slate then phyllite then gneiss.
 - d. gneiss then phyllite then slate then schist.
12. The two main types of metamorphism are
- a. igneous and sedimentary.
 - b. extreme and moderate.
 - c. regional and contact.
 - d. foliated and non-foliated.

True or False

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

- _____ 13. Foliation occurs when pressure is exerted from all directions equally.
- _____ 14. Marble is non-foliated
- _____ 15. Slate is metamorphosed shale.
- _____ 16. A metamorphic rock nearly always resembles its original parent rock.
- _____ 17. Metamorphic rocks are distinguished from igneous and sedimentary rocks because they are foliated.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. During metamorphism, _____ move between minerals.
19. A metamorphic rock with alternating bands of light and dark minerals is _____.
20. _____ metamorphism occurs when existing rock is altered by heat from a nearby magma.
21. A rock that is exposed to so much heat and pressure that it melts will cool to become a(n) _____ rock.
22. _____ due to geologic processes can cause regional metamorphism.

23. Quartzite is metamorphosed _____.
24. Banded layers found in metamorphic rock are known as _____.
25. _____ is observed in rock that underwent directional pressure.

Short Answer

Answer each question in the space provided.

26. What processes lead to the creation of hornfels? How can more than one original rock type be metamorphosed to become hornfels?

27. Describe how a metamorphic rock becomes foliated? Under what conditions does this happen?

Answer Key

1. d 2. d 3. a 4. d 5. b 6. c 7. d 8. b 9. a 10. b 11. b 12. c
13. false 14. true 15. true 16. true 17. true
18. ions 19. hornfels 20. contact 21. igneous 22. pressure 23. sandstone 24. foliation 25. foliation
26. The heat and pressure conditions that form a hornfels are extreme enough that the hornfels does not much resemble the original parent rock. Many types of rocks can be altered enough that they will end up as hornfels. Under these metamorphic conditions, the hornfels minerals rearrange themselves into light and dark bands.
27. Foliation occurs in metamorphic rocks that are exposed to extreme pressure in one direction. The crystals band together during the squeezing. }

4.5 Studying Rocks

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which type of rock forms from cooling magma?
 - a. igneous
 - b. sedimentary
 - c. metamorphic
 - d. all of these.
2. Gravel, sand, silt, or clay are types of
 - a. shards
 - b. rocklets
 - c. sediment
 - d. none of these.
3. Who is considered the Father of Geology?
 - a. Isaac Newton
 - b. James Hutton
 - c. Charles Lyell
 - d. Albert Einstein
4. What indicates the temperature at which minerals melt or crystallize?
 - a. partial melting.
 - b. fractional cystrallization.
 - c. Bowen's reactions series.
 - d. all of these.
5. How are igneous rocks classified?
 - a. size and shape
 - b. composition and grain size
 - c. texture and grain size
 - d. none of these
6. What is the primary process that causes rocks to become sediment?
 - a. weathering
 - b. erosion
 - c. pressure
 - d. transport
7. Biochemical sedimentary rocks form when living creatures use ions in water to create what?
 - a. shells

- b. bones
 - c. both of these
 - d. neither of these
8. By raising their pressure temperature enough, rocks may
- a. form new minerals
 - b. form minerals bands
 - c. form layers
 - d. all of these
9. What are the flat layers that form as rocks are squeezed called?
- a. foliation
 - b. layers
 - c. hornfels
 - d. bedding planes
10. Which metamorphic rock makes up the “lead” in pencils?
- a. marble
 - b. graphite
 - c. quartzite
 - d. gneiss

True or False

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

- _____ 11. Rocks are naturally formed, non-living material.
- _____ 12. Rocks are made up of only one type of mineral.
- _____ 13. Rocks are classified by their texture only.
- _____ 14. Precipitates are the solid materials left behind after a liquid evaporates.
- _____ 15. As magma cools, different crystals form in the process known as metamorphism.
- _____ 16. Erosion occurs when running water, ice, and gravity transports sediments from one place to another.
- _____ 17. The rock cycle describes the transformation of one type of rock to another.
- _____ 18. A pluton is an igneous extrusive rock body that has cooled in the crust.
- _____ 19. Sedimentary rocks were used in the White House because they are the hardest and most stable rocks.
- _____ 20. Organic materials are the remains of once-living organisms.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. _____ igneous rocks solidify beneath the surface.
22. _____ cooling allows time for large crystals to form.
23. Lavas that cool so rapidly that no crystals form have a _____ texture.
24. Fluids that crystallize in the spaces between the loose particles of sediments create rock by _____.
25. _____ metamorphism changes enormous quantities of rock over a wide area.
26. _____ metamorphism changes a rock that is in contact with magma because of the extreme heat.
27. The metamorphism of shale produces _____.
28. Marble is produced from the metamorphism of _____.

29. Cemented sediments become _____ sedimentary rocks.

30. _____ occurs when sediments are squeezed together by the weight of overlying sediments on top of them.

Short Answer

Answer each question in the space provided.

31. Briefly describe how igneous rocks form, then describe how both of the two main subcategories form.

32. Briefly describe how sedimentary rocks form, then describe how both of the two main subcategories form.

33. Briefly describe how metamorphic rocks form, then describe how both of the two main subcategories form.

Answer Key

1. d 2. c 3. b 4. c 5. d 6. a 7. c 8. d 9. a 10. b

11. true 12. false 13. false 14. true 15. false 16. true 17. true 18. true 19. false 20. false

21. Intrusive 22. Slow 23. glassy 24. cementation 25. Regional 26. Contact 27. slate 28. limestone 29. clastic 30. Compaction

31. Igneous rocks form as magma crystallizes. This can take place rapidly above ground to create extrusive igneous rocks or slowly below ground to create intrusive igneous rocks.

32. Sedimentary rocks are made of particles that are compacted and/or cemented together, called clastic sedimentary rocks, or they are made of chemical precipitates, called chemical sedimentary rocks.

33. Metamorphic rocks are altered by extreme heat and/or pressure. They can be caused by being close to a magma body (contact metamorphism) or by being deeply buried or exposed to pressure (regional metamorphism). }

CHAPTER 5

HS Earth's Energy Assessments

Chapter Outline

- 5.1 ENERGY RESOURCES**
 - 5.2 NON-RENEWABLE ENERGY RESOURCES**
 - 5.3 RENEWABLE ENERGY RESOURCES**
 - 5.4 EARTH'S ENERGY**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

5.1 Energy Resources

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The least expensive and most practical way to try to see that our energy needs will be met in the future is to
 - a. drill for oil wherever it is found.
 - b. develop renewable energy sources.
 - c. develop nuclear fusion.
 - d. conserve energy whenever possible.
2. Kinetic energy is
 - a. the energy stored in food.
 - b. the energy that comes from the sun to our planet.
 - c. the energy contained by a body in motion.
 - d. the energy stored by a body that is about to do work.
3. A roller coaster car at the top of a hill, right before it plunges downward has
 - a. potential energy.
 - b. kinetic energy.
 - c. momentum.
 - d. electrical energy.
4. Energy
 - a. can be created or destroyed.
 - b. cannot be created or destroyed.
 - c. can be created but not destroyed.
 - d. can be destroyed but not created.
5. Fuel
 - a. can help you to kick a soccer ball.
 - b. stores energy.
 - c. releases energy.
 - d. all of the above.
6. Heat is energy because it
 - a. comes from fossil fuels.
 - b. causes air to move.
 - c. can be used to do work.
 - d. comes from renewable resources.
7. Fossil fuels
 - a. take millions of years to form.

- b. are plentiful all over the planet.
- c. are made of renewable resources.
- d. have few environmental consequences.

8. Wood is a type of

- a. non-renewable energy.
- b. kinetic energy.
- c. biomass energy.
- d. fossil fuel energy.

9. Possible problems with renewable energy sources include

- a. they are limited in their availability.
- b. they may be expensive.
- c. they cause a lot of pollution.
- d. all of the above.

10. For an energy source to be useful, it must

- a. be able to be turned into a useful form of energy.
- b. produce significantly more energy than it takes to produce it.
- c. not produce large amounts of pollutants.
- d. all of the above.

True or False

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

- _____ 11. A fuel is any material that can release energy in a chemical change.
- _____ 12. All energy sources are renewable.
- _____ 13. Breathing and blood circulation do not require energy because we are not aware that they are happening.
- _____ 14. Energy cannot be created or destroyed.
- _____ 15. Stored energy is called potential energy.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. Energy is stored and released by _____.
17. When a fuel is burned, most of the energy is released as _____.
18. _____ is the ability to do work.
19. _____ is the energy stored within chemical bonds.
20. The partially decomposed remains of plants and animals make up _____.
21. Solar, tidal, and wind energy are examples of _____.
22. The energy contained by a body in motion is called _____ energy.
23. The energy stored in food is _____ energy.

Short Answer

Answer each question in the space provided.

24. Describe what the law of conservation of energy says and give an example of how it works.

25. What is a non-renewable resource? Describe why fossil fuels are non-renewable.

Answer Key

1. d 2. c 3. a 4. b 5. d 6. c 7. a 8. b 9. d 10. d

11. true 12. false 13. false 14. true 15. true

16. fuel 17. heat 18. Energy 19. chemical energy 20. fossil fuels 21. renewable energy 22. kinetic energy 23. chemical energy

24. The law of conservation of energy states that energy cannot be created or destroyed. Energy can only change form. The energy that you use to hit a nail with a hammer comes indirectly from the sun. A plant takes solar energy and creates food energy. You eat the food energy and store it in your body as chemical energy. As you hit the nail with your hammer, that chemical energy does work.

25. Non-renewable resources are used faster than they can be replaced. These resources may replace themselves, but over a much longer time scale than is needed for them to be used. Fossil fuels fit this description. They take millions of years to form, but we use them much more rapidly than that. }

5.2 Non-renewable Energy Resources

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

- Hydrocarbons are found as
 - solids.
 - liquids.
 - gases.
 - all of the above.
- A lot of coal formed around 300 million years ago because
 - the climate was warmer and a lot of land area was in the tropics.
 - the climate was cooler and a lot of land area was in the polar regions.
 - plant-life of all sorts was more common all around the world.
 - there was less oxygen so plant and animal remains were more easily converted to coal.
- A coal deposit that is not economical to mine today would be considered part of our _____.
 - coal reserves
 - coal resources
 - coal reservoirs
 - none of these
- To be useful, oil must be located in a(n) _____ rock layer and trapped by a(n) _____ rock layer.
 - impermeable, permeable
 - permeable, impermeable
 - impermeable, impermeable
 - permeable, permeable
- Which of the following fuels produces the least amount of carbon dioxide per unit of energy?
 - coal
 - oil
 - natural gas
 - all of these produce the same amount of carbon dioxide.
- Fuel made primarily of methane is called
 - coal
 - petroleum
 - natural gas
 - liquid gas
- The oil and natural gas that remains will last on the scale of _____ and the coal will last on the scale of _____.

- a. centuries, millennia
 - b. millennia, centuries
 - c. decades, centuries
 - d. centuries, decades
8. Oil, coal and natural gas supply approximately _____ of the energy used in the United States
- a. 15%
 - b. 25%
 - c. 45%
 - d. 85%
9. The main gases that are a by-product of burning gasoline are
- a. water vapor and carbon dioxide
 - b. carbon dioxide and sulfur compounds
 - c. sulfur compounds and nitrogen compounds
 - d. nitrogen compounds and carbon dioxide
10. The energy from a nuclear power plant
- a. is growing in use all around the world.
 - b. causes the release of greenhouse gases and other pollutants.
 - c. heats water to create steam, which spins a turbine, which turns a generator.
 - d. is transported along metal fuel rods to electrical power lines.
11. Nuclear power comes from.
- a. combustion of atoms of U 235
 - b. splitting the nucleus of U 235
 - c. fusion of atoms of U 235
 - d. breaking electrons away from the U 235 nucleus
12. Nuclear waste
- a. can be stored in water filled tanks until it is no longer radioactive.
 - b. is a small problem to deal with since nuclear power is pollutant free.
 - c. remains dangerous for hundreds of thousands of years.
 - d. is stored at the Yucca Mountain site in Nevada.

True or False

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

- _____ 13. Fossil fuels come from the remains of ancient organisms.
- _____ 14. Hydrocarbons come in liquid form only.
- _____ 15. Coal swamps were common in the Carboniferous period.
- _____ 16. Fossil fuels usage is falling worldwide.
- _____ 17. Nuclear power plants produce so much energy because the process is not controlled, although it is contained.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Chemicals made of one carbon atom and four hydrogen atoms are called _____.
19. A solid fossil fuel that is burned primarily for electricity is _____.
20. Coal may contain impurities such as _____.

21. Hydraulic fracturing is also called _____.
22. _____ occurs from the fission of atoms.
23. Ancient organisms that have been preserved in some form over time are _____.
24. Many homes throughout the U.S. are heated by clean energy that generates extremely long-term waste problems called _____.
25. The fuel for nuclear power plants is _____.

Short Answer

Answer each question in the space provided.

26. Describe how fossil fuels form.
27. Describe the process that turns coal into electricity.

Answer Key

1. d 2. a 3. a 4. b 5. c 6. c 7. c 8. d 9. a 10. c 11. b 12. c
13. true 14. false 15. true 16. false 17. false
18. hydrocarbons 19. coal 20. sulfur 21. fracking 22. nuclear energy 23. fossils 24. nuclear energy 25. uranium
26. Fossil fuels form from plants and animals in a swamp, lake or shallow sea that die and settle to the bottom. Over time, many layers accumulate and are buried. The organic material is crushed by the material above it. The weight compresses the organic material and it becomes hot. After millions of years, the organic material turns into chemicals called hydrocarbons.
27. Coal is first mined and then crushed into powder. The powder is burned in a furnace. The furnace heats water in a boiler, which creates steam. The steam spins turbines, which turn generators, which creates electricity. }

5.3 Renewable Energy Resources

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The Sun is directly or indirectly responsible for all of the following types of energy:
 - a. solar, wind, geothermal, and biomass.
 - b. solar, wind, geothermal, biomass and fossil fuels.
 - c. solar, wind, biomass and fossil fuels.
 - d. solar, geothermal, and fossil fuels.
2. Solar energy stored in material such as wood, grain, sugar, and municipal waste is (are) called _____.
 - a. fossil fuels
 - b. biomass energy
 - c. geothermal energy
 - d. natural gas
3. The primary barrier to using solar energy in the United States is that _____.
 - a. solar power is not technically feasible
 - b. solar power causes major pollution problems
 - c. solar power is not economically competitive with other energy sources
 - d. all of these
4. Solar energy
 - a. needs further research to improve technologies and bring down costs.
 - b. is the best form of renewable energy to develop everywhere on Earth.
 - c. is something that will not be developed until long into the future.
 - d. requires tremendous amounts of space that is better used for other activities.
5. People sometimes object to hydroelectric power plants because
 - a. hydroelectric power produces greenhouse gases.
 - b. a reservoir may bury natural or cultural resources.
 - c. dams release too much sediment downstream, which can bury a landscape.
 - d. hydroelectric power produces nitric acid that falls as acid rain.
6. Wind power
 - a. comes indirectly from solar energy.
 - b. is cheap to harness on a large scale.
 - c. is good green energy that is welcomed by people everywhere.
 - d. produces few pollutants, but a lot of greenhouse gases.
7. Geothermal energy
 - a. has extreme safety issues because it is so hot.

- b. could in principle be harnessed anywhere on Earth.
 - c. requires cool water be pumped into the ground to heat up.
 - d. produces few pollutants, but a lot of greenhouse gases.
8. The largest geothermal power plant in the United States is located near which city?
- a. Chicago
 - b. Los Angeles
 - c. New York
 - d. San Francisco
9. Biofuels
- a. include wood burned in a fire to heat food.
 - b. are used as solids, liquids and even gases.
 - c. born cleanly, with no pollutants or greenhouse gases.
 - d. need energy, fertilizer and cropland to produce.
10. Algae could be an excellent source of power because
- a. it goes straight into a gas tank without needing to be processed.
 - b. algae can grow in many places where food is not grown.
 - c. algae emits no carbon dioxide.
 - d. all of these.

True or False

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

- _____ 11. Wind power has been harnessed for energy for about two decades.
- _____ 12. When wood is burned in a fire, it is a biofuel.
- _____ 13. Renewable resources will eventually run out.
- _____ 14. A tremendous amount of research is going into developing wave and tide power plants.
- _____ 15. Most of the suitable sites for hydroelectric dams in the developed world have already been developed.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. _____ is the fastest growing renewable energy resource in the world.
17. _____ energy comes from plants and animals that were recently living.
18. Solar energy is carried between the Sun and Earth as _____.
19. Solar energy is the result of the _____ of hydrogen into helium.
20. When energy is transferred from a higher temperature object to an adjacent lower temperature object it is called _____.
21. The best place to develop hydroelectric power is where streams descend at a a(n) _____ grade.
22. The most abundant widely used energy resource in the world is currently _____.
23. Wind power is harnessed by a collection of windmills located on a(n) _____.

Short Answer

Answer each question in the space provided.

24. How do solar power plants turn sunlight into electricity?

25. Describe how a hydroelectric dam harnesses the energy of stored water.

Answer Key

1. c 2. b 3. c 4. a 5. b 6. a 7. b 8. d 9. d 10. b

11. false 12. false 13. false 14. false 15. true

16. wind energy 17. biomass 18. radiation 19. nuclear fusion or fusion 20. conduction 21. steep 22. hydroelectric power 23. wind farm

24. Mirrors focus sunlight onto a receiver. A is heated to high temperature as it flows through the receiver. The heat from the liquid is transferred to a nearby object by conduction and that energy is used to make electricity.

25. A dam holds the water from a stream behind it to create a reservoir. The water in the reservoir is above the stream below so it has a lot of potential energy. The water is formed to flow through a tunnel and through a turbine. The moving water has kinetic energy, which it transfers to the turbine, which is collected to a generator, which makes electricity.}

5.4 Earth's Energy

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Most of Earth's energy comes from the Sun. Where does the rest come from?
 - a. internal heat
 - b. nuclear fusion
 - c. biomass
 - d. fossil fuels
2. What type of energy is used when your body breaks down the food you eat?
 - a. kinetic
 - b. chemical
 - c. potential
 - d. nuclear
3. Which of the following energy sources does not produce carbon dioxide?
 - a. oil
 - b. nuclear
 - c. coal
 - d. natural gas
4. Nuclear fission powers _____. Nuclear fusion powers _____.
 - a. the Sun; nuclear power plants
 - b. Earth's internal heat; nuclear power plants
 - c. nuclear power plants; the Sun
 - d. Earth's internal heat; the Sun
5. Resources that will not run out are
 - a. non-infinite
 - b. infinite
 - c. renewable
 - d. non-renewable
6. Before fossil fuel use became widespread, which of the following did people use for energy?
 - a. wind
 - b. water
 - c. animals
 - d. all of these
7. What is currently the single largest source of energy used in the world?
 - a. coal

- b. oil
 - c. natural gas
 - d. wind
8. The United States has about _____ percent of the world's proven oil reserves.
- a. 55
 - b. 27
 - c. 12
 - d. 2
9. The transfer of light energy from the sun to the earth is known as. . .
- a. reflection
 - b. radiation
 - c. fusion
 - d. fission
10. What is the world's most widely used form of renewable energy?
- a. solar
 - b. wind
 - c. hydroelectric
 - d. geothermal

True or False

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

- _____ 11. The law of conservation of energy states that energy cannot be created or destroyed.
- _____ 12. Potential energy is the energy of anything in motion.
- _____ 13. The energy to make electricity comes from heat.
- _____ 14. Wind, geothermal, solar and nuclear energy are all examples of renewable energy resources.
- _____ 15. Fossil fuels come from living organisms that died and were buried hundreds of millions of years ago.
- _____ 16. Hydrocarbons can be solid, liquid or gaseous.
- _____ 17. Gasoline is different from other fossil fuels because it is a liquid.
- _____ 18. Crude oil is a pure hydrocarbon that needs little refining.
- _____ 19. Wind farms are sometimes not developed because they are considered to be unsightly.
- _____ 20. Oil is used to produce waxes, plastics, fertilizers, and other products.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. _____ is the ability to do work and produce change.
22. When you hold a ball above the ground the ball has _____ energy.
23. A _____ is any material that can release energy in a chemical change.
24. _____ resources will not run out because they are extremely abundant or rapidly replaced.
25. Animal skeletons, teeth, shells, coprolites, or any other remains or trace from a living creature that becomes a rock is a_____.
26. _____ is a liquid fossil fuel that is extremely useful because it can be used in cars and other vehicles.
27. Nuclear power plants use the element _____, which must be mined, processed and concentrated into fuel rods.

28. A technique for mining natural gas that involves pumping fluids into a reservoir rock is called _____.
29. The transfer of heat to a nearby object that is at a lower temperature through a process called _____.
30. _____ power is the fastest growing renewable energy source in the world.

Short Answer

Answer each question in the space provided.

31. What are the upsides of nuclear power? What are the downsides of nuclear power?

32. What are the advantages and disadvantages of wind power?

33. Explain the problems with non-renewable energy sources.

Answer Key

1. a 2. b 3. b 4. d 5. c 6. d 7. a 8. d 9. b 10. c
11. true 12. false 13. false 14. false 15. true 16. true 17. true 18. false 19. true 20. true

21. energy 22. potential 23. fuel 24. renewable 25. fossil 26. petroleum 27. uranium 28. fracking 29. conduction 30. wind

31. Nuclear power is clean. It does not release pollutants including greenhouse gases. However, radioactive waste is dangerous for thousands of hundreds of thousands of years and there is no plan yet for long-term storage. Also, uranium mining is potentially harmful to the environment.

32. Advantages - Wind power is clean. It doesn't release pollution or carbon dioxide. It is available in many places. Disadvantages – Wind doesn't blow all the time. People in scenic locations don't like to mar their view with windmills.

33. Non-renewable resources are found on Earth in a limited amount. They will run out eventually. Obtaining and using these resources often produces pollution or has other serious environmental impacts. Greenhouse gases are released, which can cause climate change. }

CHAPTER 6

HS Plate Tectonics Assessments

Chapter Outline

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

- The answer keys can be found in the Resource tab above the Table of Contents.

6.1 Inside Earth

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Different types of seismic waves are different in some ways, but they all travel
 - a. at the same same speed.
 - b. through all materials.
 - c. outwards in all directions.
 - d. to all of the seismographs.
2. The lithosphere is
 - a. the plates that make up the crust.
 - b. large, flat stones sitting on top of malleable magma.
 - c. the upper part of the mantle.
 - d. the plates that make up the crust and the upper part of the mantle.
3. P-waves
 - a. cannot travel through liquid material.
 - b. arrive at the same time as other types of waves at a seismograph.
 - c. travel at the same speed through Earth's internal layers.
 - d. bend slightly when they travel from one layer to another.
4. S-waves
 - a. cannot travel through liquid material.
 - b. arrive at the same time as other types of waves at a seismograph.
 - c. travel at the same speed through Earth's internal layers.
 - d. bend slightly when they travel from one layer to another.
5. Scientists know that the core is metal because
 - a. Earth's overall density is too high for it to be made just of rock.
 - b. Earth has a magnetic field, which requires liquid metal.
 - c. Some meteorites are metal; they are thought to be similar to Earth's interior.
 - d. all of these.
6. Oceanic crust is more _____. Continental crust is more _____.
 - a. felsic; mafic
 - b. mafic; felsic
 - c. extrusive; intrusive
 - d. intrusive; extrusive
7. When stresses act on the asthenosphere it
 - a. breaks.

- b. flows.
 - c. experiences earthquakes.
 - d. undergoes metamorphism.
8. Compared to continental crust, oceanic crust is
- a. thicker.
 - b. more dense
 - c. more varied in the rock types it contains.
 - d. more granitic.
9. The mantle is
- a. about half molten.
 - b. made of metal.
 - c. made of felsic minerals.
 - d. made of solid rock.
10. The transfer of heat as hot material moves is
- a. radiation
 - b. conduction
 - c. convection
 - d. heat flow
11. The composition of a rock that is rich in iron- and magnesium-rich silicate minerals is
- a. ultramafic
 - b. mafic
 - c. ultrafelsic
 - d. felsic
 - e. produce the heat that keeps the outer core molten.
12. Radioactive elements
- a. make up a large percentage of the crust.
 - b. travel through the mantle in convection currents.
 - c. are more common in oceanic crust than in continental crust.

True or False

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

- _____ 13. Diamonds come from very deep in the crust or mantle.
- _____ 14. The asthenosphere is the very thin outermost layer of the Earth.
- _____ 15. The outer core surrounds the inner core and is composed of molten metal.
- _____ 16. We can hold something like the core in our hands: a metallic meteorite.
- _____ 17. The lithosphere contains Earth's mantle and crust.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. During an earthquake, large amounts of energy are released. This energy travels through rocks as _____ - _____.
19. S-waves disappear at the core-mantle boundary so scientists know that the outer core is _____.
20. _____ waves cannot travel through the mantle.
21. The outer brittle layer of the Earth is called the _____.

22. When heat moves from higher to lower temperatures by the collisions of atoms it is called _____.
23. _____ crust is made of igneous, sedimentary and metamorphic rocks.
24. Warm mantle rises and sinks in a(n) _____.
25. Peridotite is a rock formed of the minerals pyroxene and _____.

Short Answer

Answer each question in the space provided

26. What do the different types of seismic waves indicate about Earth's interior layers?

27. Earth is made of three layers. The innermost and outermost are each made of two layers or types. What are each of these made of?

Answer Key

1. c 2. d 3. d 4. a 5. d 6. b 7. b 8. b 9. d 10. c 11. a 12. a
13. true 14. false 15. true 16. true 17. false
18. seismic waves 19. liquid or molten 20. S or secondary 21. lithosphere 22. conduction 23. continental 24. convection cell 25. olivine
26. P-waves slow down at the core-mantle boundary so scientists know that the core is less rigid than the mantle. S-waves disappear at the core-mantle boundary so they know the outer core is liquid.
27. The innermost layer is the core. The core is made of iron and nickel metal. The inner core is solid but the outer core is liquid. The next layer out is the mantle. It is composed of ultramafic rock, like peridotite. The outermost layer is the crust. There are two types: continental, which is felsic, and oceanic, which is mafic.}

6.2 Continental Drift

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The continents were last all together around
 - a. 250,000 years ago
 - b. 2.5 million years ago
 - c. 250 million years ago
 - d. 2.5 billion years ago
2. Wegener explained that Mesosaurus fossils were found on Africa and South America this way:
 - a. Africa and South America were joined when Mesosaurus lived and then moved apart.
 - b. Mesosaurus was a swimming reptile so it swam across the Atlantic Ocean.
 - c. a land bridge across the Atlantic Ocean connected the two continents.
 - d. none of these.
3. Wegener thought that grooves and rock deposits in rock left by ancient glaciers indicated that the
 - a. glaciers formed in the middle of the ocean
 - b. glaciers covered a large part of the planet
 - c. glaciers were present near the South Pole and the continents moved
 - d. climate was colder then and the glaciers could survive there
4. Mountain ranges located on both side of the Atlantic Ocean
 - a. are the same height and width.
 - b. have the same rock types, structures and ages.
 - c. have ancient fossils and coal seams.
 - d. are just separate mountain ranges.
5. Scientists didn't accept the continental drift idea because
 - a. there was almost no evidence for it.
 - b. Wegener was not liked and no one listened to him.
 - c. there were many other ways to explain the evidence.
 - d. none of these
6. Magnetic minerals in volcanic rock point to
 - a. the current north magnetic pole.
 - b. the north magnetic pole at the time they crystallized.
 - c. the north magnetic pole on the adjacent continent.
 - d. none of these.
7. The magnetic north pole
 - a. is in the same place as the geographic north pole.

- b. is the location where Earth's axis of rotation is at the surface.
 - c. is in the southern hemisphere and vice versa.
 - d. is in northern Canada.
8. Going back in time, the magnetic north pole
- a. stayed fixed in the same spot.
 - b. moved.
 - c. appeared to move.
 - d. none of these.
9. The best explanation for the past magnetic polarity of Europe and North America is
- a. the north magnetic pole moved.
 - b. the pole stood still and the continents moved.
 - c. the continents moved and the north pole moved.
 - d. none of these.
10. Wegener's idea is correctly referred to as
- a. the continental drift hypothesis.
 - b. the continental drift theory.
 - c. the plate tectonics hypothesis.
 - d. the plate tectonics theory.
11. The path(s) of the north magnetic pole on Europe and North America
- a. come together about 200 million years ago.
 - b. come together about 20 million years ago.
 - c. indicate that there were two north magnetic poles in the past.
 - d. merge into one of the continents are allowed to drift.
12. What was Wegener's continental drift idea?
- a. The continents have moved slowly apart to their current locations.
 - b. The continents have always been located at their current locations.
 - c. The continents are moving slowly together from their current locations.
 - d. None of these

True or False

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

- _____ 13. Similar fossil records across continents was evidence for continental drift.
- _____ 14. Magnetic polarity evidence supports the theory of continental drift.
- _____ 15. Alfred Wegener gave up on continental drift because he had no mechanism.
- _____ 16. The continents including the continental margins can be pieced together to form a single whole continent.
- _____ 17. The magnetic polarity evidence indicates that there were two north magnetic poles in the geologic past.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Alfred Wegener named his single supercontinent _____, which means "all Earth" in ancient Greek.
19. Coal is mined in many cold regions, but it is thought to form in _____ climates.
20. Devices that measure magnetic field intensity are called _____.
21. The most common type of minerals that record the direction and strength of the magnetic field are called _____.

22. The seeming movement of the north magnetic pole over time is called _____ polar wander.
23. The remains or traces of ancient life are called _____.
24. Rocks and structures on both sides of the _____ Ocean are very similar.
25. When all the continents are together, it is called a(n) _____ continent.

Short Answer

Answer each question in the space provided

26. How and why does the seed fern, *Glossopteris*, provide evidence that the continents were once all joined together?

27. Explain why scientists rejected the idea that continents could move about on Earth's surface.

Answer Key

1. c 2. a 3. c 4. b 5. d 6. b 7. d 8. c 9. b 10. a 11. d 12. a
13. true 14. true 15. false 16. true 17. false
18. Pangaea 19. tropical or subtropical 20. magnetometers 21. magnetite 22. apparent 23. fossils 24. Atlantic 25. super
26. *Glossopteris* seed fossils are found across all of the southern continents. The seeds are too heavy to be blown across oceans. So the most likely explanation is that the continents were together at the time *Glossopteris* was alive.
27. There was no mechanism to explain how a solid continent could move through the ocean basins. }

6.3 Seafloor Spreading

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The longer it takes for a sound wave to return to the ship
 - a. the colder the water is.
 - b. the deeper the water is.
 - c. the shallower the water is.
 - d. the more layered the water is.
2. Before they could make seafloor maps, scientists thought the topography of the seafloor
 - a. was just like the topography of the continents.
 - b. had many long linear mountain ranges, like Japan.
 - c. was dotted with lots of small hills, but nothing else.
 - d. was completely flat.
3. All deep sea trenches are located
 - a. in the middle of the mountain ranges.
 - b. at the edges of continents.
 - c. near chains of active volcanoes.
 - d. none of these.
4. In the Atlantic Ocean, the mid-ocean ridge is
 - a. a straight line between the Americas and Europe/Africa.
 - b. a line that nearly has the shape of the coastlines of the Americas and Europe/Africa.
 - c. not visible.
 - d. none of these
5. At a time of reversed magnetic polarity, the north and south poles are
 - a. aligned as they are now.
 - b. in different locations from where they are now.
 - c. in the opposite positions from where they are now.
 - d. none of these.
6. Magnetic polarity stripes
 - a. end at the edge of a continent.
 - b. end at a deep sea trench.
 - c. end at a mid-ocean ridge.
 - d. a or b
7. The thickest sediments in the ocean basins are found
 - a. at the top of the mid-ocean ridge.

- b. in the flat, featureless regions.
 - c. the furthest distance from the mid-ocean ridge axis.
 - d. none of these.
8. The hottest region of the ocean basin is found
- a. at the top of the mid-ocean ridge.
 - b. in the flat, featureless regions.
 - c. the furthest distance from the mid-ocean ridge axis.
 - d. none of these.
9. With distance from the mid-ocean ridge
- a. the crust becomes thicker.
 - b. the sediment becomes thinner.
 - c. the rocks become younger.
 - d. none of these.
10. The oldest oceanic crust is
- a. found at the mid-ocean ridges.
 - b. beneath the least amount of sediment.
 - c. older than the oldest continental crust.
 - d. less than 180 million years old.
11. New oceanic crust is created
- a. at mid-ocean ridges.
 - b. at deep sea trenches.
 - c. within abyssal plains.
 - d. at long, linear chains of volcanoes.
12. Since new oceanic crust is being created
- a. Earth must be getting larger.
 - b. mountains must be rising somewhere.
 - c. old crust must be destroyed somewhere.
 - d. none of these.

True or False

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

- _____ 13. Two different plates of lithosphere lie on each side of the mid-ocean ridge.
- _____ 14. The mid-ocean ridge is the longest mountain range on Earth.
- _____ 15. The mid-ocean ridge is only found in the Atlantic Ocean.
- _____ 16. The seafloor is oldest at the mid-ocean ridges
- _____ 17. Heat flow is highest at deep sea trenches.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The depth of the ocean floor can be recorded by using a(n) _____.
19. Seafloor maps were made using data gathered during the historical event called _____.
20. A map of the seafloor is called a(n) _____ map.
21. The flat areas of the oceans are called the _____.
22. When the magnetic poles switch positions, the _____ becomes the _____.

23. Beneath the mid-ocean ridge, there is molten rock in a(n)_____
24. The mechanism for drifting continents is _____.
25. Old seafloor is destroyed at _____

Short Answer

Answer each question in the space provided

26. Describe the patterns of the magnetic stripes around the mid-ocean ridge.

27. Describe the seafloor spreading hypothesis.

Answer Key

1. b 2. d 3. c 4. b 5. c 6. d 7. c 8. a 9. a 10. d 11. a 12. c
13. true 14. true 15. false 16. false 17. false
18. echo sounder 19. World War II 20. bathymetric 21. abyssal plains 22. north pole becomes the south pole OR the south pole becomes the north pole 23. magma chamber 24. seafloor spreading 25. deep-sea trenches
26. Stripes are symmetrical on both sides of the mid-ocean ridge. On the ridge, the stripe has normal polarity. On both sides of it, the stripes have reversed polarity. This pattern of normal and reversed goes symmetrically away from the ridge across the seafloor. It creates a mirror image.
27. Hot buoyant magma rises through through the crust and erupts at the mid-ocean ridge. The new crust takes on the magnetic polarity at the time it cools. More new magma rises into the space and pushes the new seafloor outward. This may push a continent along. }

6.4 Theory of Plate Tectonics

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Earth's plates are made of slabs of
 - a. crust
 - b. upper mantle
 - c. crust and upper mantle
 - d. asthenosphere
2. How can two lithospheric plates move relative to each other?
 - a. They can only converge or diverge.
 - b. They can only collide or slide along each other.
 - c. They can collide, pull apart, or slide against each other.
 - d. They can only move toward each other.
3. What are the results of plate tectonic processes?
 - a. volcanoes form
 - b. ocean basins form
 - c. mountains form
 - d. all of these
4. The outlines of the plates are located by mapping
 - a. earthquake epicenters.
 - b. continental margins.
 - c. the locations of earthquake faults.
 - d. mid-ocean ridges.
5. What is the driving force for plate tectonics?
 - a. gravity slab pull
 - b. the push of the mid-ocean ridge
 - c. the gravity of the Moon and Sun
 - d. mantle convection
6. If a divergent plate boundary is found within a continent,
 - a. a line of volcanoes forms.
 - b. a subduction zone forms.
 - c. the continent rifts apart.
 - d. none of these.
7. The geological activity at subduction zones is
 - a. the creation of new seafloor.

- b. lots of earthquakes and volcanoes.
 - c. hotspot volcanoes.
 - d. fairly nonexistent.
8. An island arc forms when
- a. two oceanic plates diverge.
 - b. a continental plate subducts beneath an oceanic plate.
 - c. an oceanic plate subducts beneath a continental plate.
 - d. an oceanic plate subducts beneath an oceanic plate.
9. Mountain ranges form at continent-continent convergence zones because
- a. continental plates are too buoyant to subduct.
 - b. these zones are the site of a lot of volcanic activity.
 - c. continental rifting leads to uplift.
 - d. none of these.
10. In the Hawaiian islands, the youngest volcano
- a. is about to subduct into a deep sea trench.
 - b. is above a hotspot.
 - c. is above a mid-oceanic ridge in the Pacific.
 - d. is topped by limestone.
11. Like the Cascades, the Sierra Nevada are the result of
- a. continent-continent convergence.
 - b. subduction of an oceanic plate beneath a continental plate.
 - c. ocean-ocean convergence.
 - d. transform motion like that at the San Andreas Fault.
12. Plate tectonics theory says that
- a. Earth's geography has been the same for all geologic time.
 - b. Earth's geography is continually changing.
 - c. all geological activity happens at plate boundaries.
 - d. continents drift but scientists do not yet know why.

True or False

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

- _____ 13. All geological activity - volcanoes and earthquakes - takes place at plate boundaries.
- _____ 14. At transform plate boundaries, two plates move toward each other.
- _____ 15. Limestone is found at the top of the Andes due to convergence.
- _____ 16. Seafloor spreading is what makes the continents move.
- _____ 17. The youngest volcano in Hawaii is below sea level.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. New land is created at a _____ plate boundary.
19. The point on Earth's surface above where an earthquake occurs is the _____.
20. Large bodies of magma cool to form _____.
21. The Hawaiian Island chain was formed by a(n) _____.
22. Volcanoes are caused by the _____ of one plate under another.

23. The volcanoes of Central America are a(n) _____ caused by subduction of tectonic plates.
24. The Himalayan Mountains rise at a(n) _____ plate boundary.
25. The continuous joining and separating of landmasses is known as the _____ cycle.

Short Answer

Answer each question in the space provided

26. Draw a picture of two adjacent convection cells. Label the following features: mid-ocean ridge, new oceanic crust, a deep sea trench, the lithosphere, mantle, and core.

27. How do the continents move around on the solid Earth?

Answer Key

1. c 2. c 3. d 4. a 5. d 6. c 7. b 8. d 9. a 10. b 11. b 12. b
13. false 14. false 15. true 16. true 17. true
18. divergent 19. epicenter 20. batholiths 21. hotspot 22. subduction 23. continental arc 24. convergent 25. supercontinent
26. See the diagram of mantle convection in the text.
27. Convection brings magma to the surface at the mid-ocean ridge. New seafloor is created and pushes the older seafloor outward from the ridge. On each side of the ridge is oceanic crust. Away from the ridge there may be continental crust. As the new seafloor is created, it pushes the continent. }

6.5 Plate Tectonics

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Scientists learn about our planet's interior from
 - a. tracking seismic waves
 - b. probes in deep mines
 - c. diving into deep ocean trenches
 - d. satellite imagery
2. Because S-waves disappear when they reach the outer core, scientists know that it is
 - a. metal.
 - b. molten.
 - c. ultramafic rock.
 - d. not knowable.
3. The lithosphere
 - a. is partially molten.
 - b. is brittle.
 - c. behaves plastically.
 - d. can flow.
4. Which mechanism moves heat from the warmer to cooler places until all are the same temperature?
 - a. radiation
 - b. convection
 - c. conduction
 - d. none of the above
5. During the time of Pangaea,
 - a. organisms lived side-by-side that are now fossils on distant continents.
 - b. there was no Atlantic Ocean.
 - c. there were one magnetic north pole.
 - d. all of these.
6. Across the seafloor, scientists find
 - a. flat, sediment covered bathymetry.
 - b. increasing crust thickness toward the mid-ocean ridges.
 - c. magnetic stripes with normal and reversed polarity.
 - d. none of the above
7. What revealed high mountain ranges and deep trenches in the sea floor?
 - a. bathymetric maps

- b. satellite maps
 - c. topographic maps
 - d. none of these
8. Volcanoes are found at _____ plate boundaries; earthquakes happen at _____ plate boundaries.
- a. all three types of; all three types
 - b. all three types of; divergent and convergent
 - c. divergent and convergent; all three types of
 - d. divergent and convergent; divergent and convergent
9. _____ crust subducts under _____ crust because it is _____.
- a. Continental; oceanic; denser
 - b. Continental; oceanic; buoyant
 - c. Oceanic; continental; buoyant
 - d. Oceanic; continental; denser
10. What type of plate boundary is found at the San Andreas Fault?
- a. convergent
 - b. divergent
 - c. transform
 - d. none of the above

True or False

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

- _____ 11. Continental crust is thicker and more mafic than oceanic crust.
- _____ 12. P-waves can travel through the core.
- _____ 13. A new supercontinent forms about every 500,000,000 years.
- _____ 14. Continental crust is too thick for hotspot volcanoes to break through.
- _____ 15. Metallic meteorites are thought to be representative of the core.
- _____ 16. The eastern United States has three types of plate boundaries offshore.
- _____ 17. Earth's strong magnetic field is caused by convection in the mantle.
- _____ 18. Some rocks found on opposite sides of the Atlantic are extremely similar in type and age.
- _____ 19. The continents can fit together like pieces of a puzzle.
- _____ 20. Wegener used fossil evidence to support his seafloor spreading hypothesis.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. _____ waves move in an up and down motion perpendicular to the direction of travel.
22. The _____ is composed of hot, ultramafic rock.
23. The core is mostly composed of _____ metal.
24. _____ are flat areas in ocean basins, although many are dotted with volcanic mountains.
25. The volcanoes of the _____ are caused by the subduction of the Juan de Fuca Plate beneath the North American plate.
26. Seafloor spreading create new oceanic crust at mid-ocean _____ and destroy older crust at deep sea _____.

27. Geological activity that occurs away from plate boundaries is called _____ activity.
28. The edges of continental plates can be drawn by connecting the dots that mark _____ epicenters.
29. Lithospheric plates move at the rate of a few _____ per year.
30. The line of volcanoes that grows on the upper oceanic plate at ocean-ocean convergence is called a(n) _____ - _____.

Short Answer

Answer each question in the space provided.

31. List the three types of plate boundaries and describe the motion of each.

32. List the evidence for continental drift.

33. Diagram and describe the internal structure of Earth.

Answer Key

1. a 2. b 3. b 4. c 5. d 6. c 7. a 8. c 9. d 10. c

11. false 12. true 13. true 14. false 15. true 16. false 17. false 18. true 19. true 20. false

21. s-waves (secondary) 22. mantle 23. iron 24. Abyssal plain 25. Cascade Range 26. ridges; trenches 27. intraplate 28. earthquake 29. centimeters 30. island arc

31. The three types are:

- Divergent – two plates move away from each other.
- Convergent – the two plates move towards each other.
- Transform – the two plates slip past each other.

32. Possible answers:

- Identical rocks on both sides of the Atlantic Ocean.
- Mountain ranges with the same rock types and structures on opposite sides of the Atlantic Ocean.
- Ancient fossils of the same species of extinct plants and animals are found in rocks of the same age but are on continents that are now widely separated. The organisms could not have traveled across the ocean when alive.
- Grooves and rock deposits left by ancient glaciers are found on different continents.
- Ancient coral reefs and coal seams are found in locations where it is much too cold for them to develop today.

33. Internal structure:

- Crust – outermost and thinnest layer of the earth – made of rock. Two types: continental and oceanic.
- Lithosphere – is the outermost layer, brittle and can break, is about 100 km thick.
- Mantle – made of solid ultramafic rock and is hot – convection occurs here.
- Core – iron and nickel metal is composition; outer is liquid, inner is solid. Convection in the outer core produces the magnetic field. }

CHAPTER 7

HS Earthquakes Assessments

Chapter Outline

- 7.1 STRESS IN EARTH'S CRUST
 - 7.2 THE NATURE OF EARTHQUAKES
 - 7.3 MEASURING AND PREDICTING EARTHQUAKES
 - 7.4 STAYING SAFE IN EARTHQUAKES
 - 7.5 EARTHQUAKES
-

- The answer keys can be found in the Resource tab above the Table of Contents.

7.1 Stress in Earth's Crust

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The amount of ground displacement in a earthquake is called the _____.
 - a. epicenter
 - b. dip
 - c. slip
 - d. focus
2. When stress causes a material to change shape it has undergone
 - a. confining stress.
 - b. compression.
 - c. strain.
 - d. fracture.
3. When the stress on a rock becomes too high, the rock will
 - a. undergo elastic deformation.
 - b. undergo plastic deformation.
 - c. melt.
 - d. fracture.
4. What type of faulting would be most likely to occur along transform faults?
 - a. normal faulting
 - b. reverse faulting
 - c. strike-slip faulting
 - d. all of these
5. The amount of stress needed to make rocks fracture is less
 - a. at the surface.
 - b. deeper in the crust.
 - c. in the mantle.
 - d. the same throughout Earth's layers.
6. The stresses that cause the Himalaya to rise are
 - a. tension
 - b. compression
 - c. shear
 - d. confining
7. Rock layers in an anticline
 - a. fold upward.

- b. fold downward.
 - c. plunge toward the ground in one direction.
 - d. create a dome.
8. Sediments that become sedimentary rocks are deposited
- a. vertically.
 - b. horizontally.
 - c. along hillsides.
 - d. deformationally.
9. In the Grand Canyon, the Kaibab Limestone is above the Toroweap Formation. We can say that
- a. the Kaibab is the oldest rock layer in the canyon.
 - b. the Toroweap is the oldest rock layer in the canyon.
 - c. the Kaibab is older than the Toroweap.
 - d. the Toroweap is older than the Kaibab.
10. When rocks deform plastically, they tend to
- a. return to their original state.
 - b. fold.
 - c. break.
 - d. fracture.
11. In a normal fault,
- a. the fault plane is roughly vertical.
 - b. the dip of the fault plane is nearly horizontal.
 - c. the hanging wall pushes up relative to the footwall.
 - d. the footwall pushes up relative to the hanging wall.
12. Large mountain ranges, like the Grand Tetons in Wyoming, are uplifted on
- a. normal faults
 - b. reverse faults
 - c. dip-slip faults
 - d. strike-slip faults

True or False

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

- _____ 13. If very old rocks are above much younger rocks there may be a thrust fault in between.
- _____ 14. A deeply buried rock is under compressive stresses.
- _____ 15. A mountain range, known as a basin-and-range, is caused by compressive forces.
- _____ 16. In a dip-slip fault, the footwall drops down relative to the hanging wall.
- _____ 17. In a strike-slip fault, the dip of the fault plane is vertical.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Forces that pull rocks apart are called _____.
19. The San Andreas fault is a _____ lateral, _____ fault.
20. A break in rock along which there is no movement is a(n) _____.
21. If a rock returns to its original shape when a stress is removed it has undergone _____.
22. A fold that bends down in the center is a(n) _____.

23. In a _____ fault, the hanging wall moves upward relative to the footwall.
24. The displacement of rocks on either side of a _____ fault can be hundreds of miles.
25. An eroded _____ will have oldest rock layer found at the core.

Short Answer

Answer each question in the space provided.

26. List and briefly describe the four different types of stress.

27. Describe the plate tectonics setting that is causing the rise of the Himalaya Mountains.

Answer Key

1. c 2. c 3. d 4. c 5. a 6. b 7. a 8. b 9. c 10. d 11. b 12. d
13. true 14. false 15. false 16. false 17. true
18. tensional 19. right; strike-slip 20. joint 21. elastic deformation 22. syncline 23. normal 24. strike-slip 25. dome
26. Confining stress: The stress that comes from the weight of all the material above a rock. Compression: The stress of rocks being squeezed together. Tension: The stress of rocks being pulled apart. Shear: The stress from forces that are parallel but moving in opposite directions.
27. The Indian plate is moving northward and running into the Eurasian plate. This compressional stress is causing the continental crust to crumple upwards and create a mountain range. }

7.2 The Nature of Earthquakes

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Body waves consist of _____.
 - a. P waves only
 - b. S waves only
 - c. P and S waves
 - d. Surface waves
2. Earthquakes cause _____ faulting.
 - a. normal
 - b. reverse
 - c. thrust
 - d. all of these
3. How do rock particles move during the passage of a P wave through the rock?
 - a. back and forth parallel to the direction of wave travel
 - b. back and forth perpendicular to the direction of wave travel
 - c. in a rolling circular motion
 - d. up and down perpendicular to the direction of wave travel.
4. How do rock particles move during the passage of a S wave through the rock?
 - a. back and forth parallel to the direction of wave travel
 - b. back and forth perpendicular to the direction of wave travel
 - c. in a rolling elliptical motion
 - d. up and down perpendicular to the direction of wave travel
5. When a P wave travels from a solid to a liquid, its velocity
 - a. stays the same
 - b. increases
 - c. decreases
 - d. ends, because the wave can't travel through a liquid.
6. When a S wave travels from a solid to a liquid, its velocity
 - a. stays the same
 - b. increases
 - c. decreases
 - d. ends, because the wave can't travel through a liquid.
7. Surface waves
 - a. are of two types: Love waves and Rayleigh waves.

- b. travel through the planet.
 - c. are the fastest seismic waves.
 - d. all of these.
8. Shallow earthquakes, less than 20 km deep, are associated with _____ .
- a. convergent plate boundaries
 - b. divergent plate boundaries
 - c. transform plate boundaries
 - d. all of these
9. The point where movement occurred which triggered the earthquake is the _____ .
- a. dip
 - b. focus
 - c. epicenter
 - d. strike
10. Which of the following major earthquakes did not occur at a plate boundary?
- a. 1812 New Madrid, Missouri
 - b. 1906 San Francisco, California
 - c. 1964 Anchorage, Alaska
 - d. 1989 Loma Prieta, California
11. The San Andreas Fault
- a. is where the Pacific Plate subducts beneath the North American Plate.
 - b. is part of the ring of volcanoes and earthquakes around the Pacific Ocean basin.
 - c. is the fault where all major earthquakes occur in California.
 - d. is the site of shallow, intermediate and deep focus earthquakes.
12. An earthquake in the New Madrid, Missouri seismic zone
- a. would not kill many people; only 20 died in 1812.
 - b. would not kill many people; earthquakes on the fault are fairly small.
 - c. could kill many times more people than in 1812.
 - d. will not happen again; the 1812 quake relieved the stresses.

True or False

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

- _____ 13. Earthquakes at divergent boundaries tend to be small.
- _____ 14. The height of a seismic wave is known as its wavelength.
- _____ 15. Sea waves from earthquakes can devastate coasts but be unnoticed at sea.
- _____ 16. The Seismic Wave Theory explains how earthquakes occur.
- _____ 17. About 95% of earthquakes occur along the three types of plate boundaries.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Seismic waves that travel through the body of a planet are known as _____.
19. The _____ of the earthquake was located 10 km below the surface.
20. The lowest point on a wave is the _____.
21. _____ is the study of earthquakes.
22. The distance between _____ and _____ is called wavelength.

23. After the Pacific basin, the region most likely to experience earthquakes is the _____.
24. The seismic waves that do most of the damage in an earthquake are _____.
25. Waves that devastate coastlines and are most often caused by an earthquake is called a(n) _____.

Short Answer

Answer each question in the space provided.

26. Describe the seismology of convergent plate boundaries. Where are there earthquakes relative to the subducting plate both horizontally and vertically?

27. Explain elastic rebound theory.

Answer Key

1. c 2. d 3. a 4. d 5. c 6. d 7. a 8. d 9. b 10. a 11. b 12. c
13. true 14. false 15. true 16. false 17. true
18. body waves 19. focus 20. trough 21. seismology 22. two adjacent waves' crests or troughs 23. Mediterranean-Asiatic belt 24. surface waves 25. tsunami
26. Convergent plate boundaries have a tremendous number of earthquakes due to the subducting plate plowing through the mantle. Earthquakes occur all along the plate, until it is deep and hot enough to deform plastically rather than elastically. In this situation there are shallow, intermediate and deep equates. The quakes are not at the trench but inward of it, above the subducting plate.
27. Stresses build on both sides of a fault. At first, the rocks deform plastically. When the stresses become too great, the rocks deform elastically; that is they break. This releases the built up stress causes the rocks to move to a different location. }

7.3 Measuring and Predicting Earthquakes

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. If a seismograph records P-waves but not S-waves from an earthquake, it means
 - a. the quake wasn't very strong.
 - b. the quake was very far away.
 - c. the quake was on the opposite side of the planet.
 - d. the seismograph was in the wrong spot.
2. How often do earthquakes with magnitude between 8.0 and 8.9 occur?
 - a. about 5 to 10 times per year
 - b. about once a year
 - c. about every 5 to 10 years
 - d. about every 50 to 100 years
3. The difference in arrival times between which pair of waves can be used to determine the distance to the epicenter?
 - a. P and surface
 - b. A and surface
 - c. A and P
 - d. None of the above
4. The amplitude of the largest wave during a Richter magnitude 8 earthquake is _____ times as in a magnitude 6 earthquake.
 - a. 2
 - b. 10
 - c. 100
 - d. 1000
5. What causes the up-and-down wiggles on the seismogram show above?
 - a. variations in air pressure
 - b. ground vibrations
 - c. tsunami waves
 - d. electromagnetic pulses
6. Where is the focus with respect to the epicenter?
 - a. directly below the epicenter
 - b. directly above the epicenter
 - c. in the P wave shadow zone
 - d. in the S wave shadow zone

7. Which of the following measures an earthquake's intensity based on the observed effects on people and structures?
 - a. Richter scale
 - b. Modified Mercalli scale
 - c. the Centigrade scale
 - d. the moment magnitude scale
8. Which of the following statements best describes the state of earthquake prediction?
 - a. scientists can accurately predict the time and location of almost all earthquakes
 - b. scientists can accurately predict the time and location of about 50% of all earthquakes
 - c. scientists can accurately predict when an earthquake will occur, but not where
 - d. scientists can characterize the seismic risk of an area, but can not yet accurately predict most earthquakes
9. The longer the difference in the arrival time of the first P-wave and the first S-wave
 - a. the farther away is the epicenter.
 - b. the closer is the epicenter.
 - c. the deeper is the epicenter.
 - d. the shallower is the epicenter.
10. Which of the following statements is true?
 - a. As the distance to an earthquake increases, the elapsed time before the P-waves arrive decreases.
 - b. As the distance to an earthquake increases, the elapsed time before the S-waves arrive increases.
 - c. As the distance to an earthquake increases, the elapsed time between the arrival of the P- and S-waves increases.
 - d. As the distance to an earthquake increases, the ground shaking increases.
11. Who developed the procedure used to measure the size of an earthquake?
 - a. Charles Richter
 - b. James Hutton
 - c. Henri Darcy
 - d. Charles Darwin
12. On the magnitude moment scale, the increase in the amount of energy released from between an 7.2 and a 9.2 earthquake is
 - a. 900 times
 - b. 300 times
 - c. 100 times
 - d. 30 times

True or False

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

- _____ 13. Seismographs can help to determine the intensity of an earthquake.
- _____ 14. The intensity of an earthquake is directly related to its distance from the epicenter.
- _____ 15. There are around 150,000 earthquakes that are felt each year.
- _____ 16. Scientists have an easier time predicting when an earthquake will occur than where it will occur.
- _____ 17. The time difference between the P & S wave shows the intensity of an earthquake.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The first seismic waves to arrive at a seismograph are the _____.

19. The magnitude of an earthquake can be determined by the _____ of the waves.
20. The _____ of a circle around a seismic station gives the distance of the earthquake epicenter from that station.
21. The _____ scale was the first quantifiable scale used to measure an earthquake.
22. An older type of seismometer is known as a(n) _____.
23. Scientists estimate the _____ that an earthquake will occur in a particular location in a certain time frame.
24. To find an earthquake epicenter, you need data from a minimum of _____ seismographs.
25. Since 1900 there have been _____ earthquakes in the magnitude 9 range.

Short Answer

Answer each question in the space provided.

26. How do scientists determine the distance of an earthquake epicenter from a seismograph?

27. Why is the moment magnitude scale better than the Richter scale for expressing earthquake magnitude?

Answer Key

1. a 2. b 3. d 4. c 5. b 6. b 7. b 8. d 9. a 10. c 11. a 12. a
13. true 14. false 15. true 16. false 17. false
18. P-waves 19. amplitude 20. radius 21. Richter 22. seismograph 23. probability 24. three 25. five
26. P-waves travel faster than S-waves. The further the waves need to travel the further ahead the P-waves can get. So the difference in the arrival time of the two wave types can be used to calculate the distance to the epicenter.
27. The moment magnitude scale measures the total energy released by an earthquake, whereas the Richter scale

measures the energy released by the largest jolt. These values could be very different; e.g. if a quake is very long but doesn't have any very large jolts, the total amount of energy released (and the damage done) could be very high. }

7.4 Staying Safe in Earthquakes

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which of the following hardly ever kills anyone in an earthquake?
 - a. structures falling
 - b. ground shaking
 - c. fire
 - d. tsunami
2. Not too many people died in the Great Alaska Earthquake in 1964 because
 - a. few people lived in the area.
 - b. it was not a large quake.
 - c. the ground was so solid that the shock was absorbed.
 - d. none of these.
3. The magnitude of an earthquake is
 - a. positively correlated with the number of deaths.
 - b. negatively correlated with the number of deaths.
 - c. the most important factor in determining the number of fatalities.
 - d. just one of several factors that determines the number of fatalities.
4. If you want to be safe in an earthquake, build your house on
 - a. soft sediments that absorb shock.
 - b. sediments that will undergo liquefaction.
 - c. solid bedrock.
 - d. any type of ground is fine, just build a solid house.
5. For a skyscraper to be safe in earthquake country, it must be
 - a. built on soft ground.
 - b. anchored to bedrock.
 - c. built on bedrock.
 - d. b or c
6. To stay upright in an earthquake, large buildings must
 - a. be absolutely stiff so that they do not fall.
 - b. be built of solid materials like brick and stone.
 - c. sway so that they absorb shock.
 - d. b or c
7. To make an existing building earthquake safe
 - a. tear it down and start again.

- b. build an external support structure.
 - c. lift it up and place rollers beneath it.
 - d. b or c
8. To keep gas lines and water mains from breaking in an earthquake,
- a. make them completely solid so that they don't break.
 - b. put them above ground so that they don't break.
 - c. zigzag the pipes so that they bend to absorb ground shaking.
 - d. b c
9. Which of the following is something that you should NOT do during an earthquake.
- a. Take an elevator to the ground floor so that you can run outside.
 - b. Stay away from things that can break or fall on you.
 - c. Dive underneath a sturdy piece of furniture.
 - d. Run to an open area if you are outside.
10. Which of the following is something that you should NOT do after an earthquake.
- a. Turn off water and power to your home.
 - b. Avoid dangerous areas, like hillsides or places where buildings may collapse.
 - c. Help others who need assistance.
 - d. Call everyone you know to tell them about your experience.

True or False

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

- _____ 11. In case of an earthquake, a one day supply of food and water is enough for a family.
- _____ 12. Large buildings can be placed on rollers so that they move as the ground moves.
- _____ 13. The largest recorded earthquake was 12.3 on the Richter Scale
- _____ 14. City planners predict the Mercalli Intensity of a future earthquake around the region.
- _____ 15. Elevated freeways cannot be retrofitted for earthquakes

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. When sediments mix with water and become like quicksand, they have undergone _____.
17. A building undergoes _____ when it is altered to be more safe in an earthquake.
18. In the 1906 San Francisco earthquake, the most damage was done by _____.
19. To hold down sway, a large building should have _____ (geometry) _____ (material) beams.
20. In San Francisco, water and gas pipelines are separated by _____ so that one segment can be isolated from the rest.
21. An earthquake kit should have _____ days of supplies.
22. _____ light bulbs are less of a fire risk than incandescent bulbs.
23. You should have flashlights available if the power goes out and don't forget the _____ to keep them working.

Short Answer

Answer each question in the space provided.

24. List five things that a family in an earthquake zone should do to prepare for an earthquake.

25. Explain why all of the structures built in the United States are not built to meet earthquake standards.

Answer Key

1. b 2. a 3. d 4. c 5. d 6. c 7. b 8. c 9. a 10. d

11. false 12. true 13. false 14. true 15. false

16. liquefaction 17. retrofitting 18. fire 19. diagonal, steel 20. valves 21. three 22. fluorescent 23. batteries

24. Choose any five from the list from the subsection *Protecting Yourself in an Earthquake*.

25. Building to meet earthquake codes is very expensive. Some regions just don't expect to have major earthquakes so that would be wasted money. Even in earthquake zones cost must be balanced with the possible hazard because it's just too expensive to build every building to the highest standards. }

7.5 Earthquakes

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which forces squeeze rocks together, causing them to fold or fracture?
 - a. shear
 - b. tension
 - c. compression
 - d. strain
2. When rocks deform plastically under compression stresses they
 - a. create folds
 - b. create faults
 - c. create shears
 - d. break
3. At which type of plate boundary boundary, do the world's largest mountains grow?
 - a. transform
 - b. divergent
 - c. convergent
 - d. none of the above
4. The sudden release of energy stored in rocks creates
 - a. earthquakes
 - b. folds
 - c. volcanoes
 - d. none of these
5. The main reason there are so many earthquakes around the Pacific ocean basins is
 - a. the tremendous number of convergent plate boundaries.
 - b. the tremendous number of divergent plate boundaries.
 - c. the tremendous number of transform plate boundaries.
 - d. the extreme solidity of the Pacific plate.
6. To find an earthquake epicenter, a seismologist needs to know
 - a. the intersection of two circles from two seismic stations.
 - b. the distances from three different seismic stations to the epicenter.
 - c. the epicenter distance from 10 seismic stations.
 - d. the difference in the arrival times of the first P- and S-waves at a seismic station.
7. As stresses build in a region
 - a. the rocks break quickly.

- b. the rocks deform plastically and then break.
 - c. the rocks deform plastically but bounce back into shape.
 - d. b c
8. Mountain ranges rise where there are
- a. shear stresses.
 - b. compressive stresses.
 - c. tensional stresses.
 - d. b c
9. A useful earthquake prediction will include the quake's
- a. type
 - b. timing
 - c. magnitude
 - d. b c
10. One reason fewer people die in developed nations than developing ones in the same magnitude earthquake is
- a. there is a lower population density.
 - b. in developed nations, people only build in safe places.
 - c. the quality of construction is better.
 - d. there is better earthquake prediction in developed nations.

True or False

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

- _____ 11. Shear stress is the most common stress at transform plate boundaries
- _____ 12. A fracture is when the rock breaks.
- _____ 13. Stress applied over time often leads to plastic deformation.
- _____ 14. Sedimentary rocks are formed with the youngest layers on the bottom and the oldest on top.
- _____ 15. Sedimentary rocks layers that are not horizontal are deformed.
- _____ 16. An anticline is a fold that bends downward.
- _____ 17. The movement of blocks of rocks on one or both sides of a fracture is called a joint.
- _____ 18. Slip is the distance rocks move along a fault.
- _____ 19. Two converging continental plates smash downwards and create mountain ranges.
- _____ 20. In an earthquake, the initial point where the rocks rupture in the crust is called the epicenter.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. Rocks that are pulled apart are under _____ .
22. When stress causes a material to change, it has undergone _____.
23. _____ are deposited horizontally, so sedimentary rock layers are horizontal.
24. A _____ is a simple bend in the rock layers so that they are no longer horizontal.
25. A _____ is a circular structure in which the rocks bend downward.
26. A _____ fault is a type of reverse fault in which the fault plane angle is nearly horizontal.
27. Besides California, the country of _____ has a major transform plate boundary.
28. The waves that do the most damage in an earthquake are _____ waves.

29. The height of a wave from the center line to its crest is its _____.
30. The study of seismic waves is known as _____.

Short Answer

Answer each question in the space provided.

31. Explain why the 2004 Indian Ocean Earthquake was so deadly.

32. List the three methods for describing earthquake size. Explain each.

33. Explain the difficulty of earthquake prediction.

Answer Key

1. c 2. a 3. c 4. a 5. a 6. b 7. b 8. d 9. d 10. c
11. true 12. true 13. true 14. false 15. true 16. false 17. false 18. true 19. false 20. false
21. tension 22. Strain or deformation 23. sediments 24. monocline 25. basin 26. thrust 27. New Zealand 28. surface
29. amplitude 30. seismology

31. The earthquake was a magnitude 9.2, the second largest ever recorded. The quake didn't do that much damage, but it created several tsunamis. The position of the earthquake generated the tsunami in all directions around the Indian Ocean. Sumatra was struck by the tsunami 15 minutes after the earthquake – so there was little warning. The lands around the area are largely low-lying and there was no escape. There was no tsunami warning system at the time. 230,000 people died in 8 countries.

32. The three methods are:

- Mercalli Intensity Scale. Earthquakes are described in terms of what nearby residents felt and the damage that was done to nearby structures.
- Richter magnitude scale. Developed in 1935 by Charles Richter, this scale uses a seismometer to measure the magnitude of the largest jolt of energy released by an earthquake.
- Moment magnitude scale. Measures the total energy released by an earthquake. Moment magnitude is calculated from the area of the fault that is ruptured and the distance the ground moved along the fault.

33. Where an earthquake will occur is the easiest to predict because scientists know that earthquakes take place at plate boundaries. They look at the history of a region to see if it's prone to quakes. When an earthquake will occur is more difficult – stress builds up over time but scientists are unable to predict when an earthquake will occur even to within a few years. There are no always any warning signs before an earthquake. }

CHAPTER **8** HS Volcanoes Assessments

Chapter Outline

- 8.1** WHERE VOLCANOES ARE LOCATED
 - 8.2** VOLCANIC ERUPTIONS
 - 8.3** TYPES OF VOLCANOES
 - 8.4** VOLCANIC LANDFORMS AND GEOTHERMAL ACTIVITY
 - 8.5** VOLCANOES
-

- The answer keys can be found in the Resource tab above the Table of Contents.

8.1 Where Volcanoes Are Located

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. For mantle rock to melt,
 - a. pressure must rise.
 - b. temperature must rise.
 - c. there must be little to no water.
 - d. all of these.
2. Volcanoes occur at which of the following
 - a. convergent plate boundaries
 - b. divergent plate boundaries
 - c. hotspots
 - d. all of the above
3. Why are there volcanoes in Central America?
 - a. the area is an extension of the San Andreas Fault
 - b. subduction at the Middle American Plate
 - c. subduction of the Juan de Fuca plate
 - d. none of the above
4. Melting takes place at divergent plate boundaries because
 - a. temperature is lowered.
 - b. pressure is lowered.
 - c. water is added
 - d. all of these.
5. At divergent plate boundaries
 - a. hot mantle rock rises.
 - b. hot mantle rock sinks back into the mantle.
 - c. the addition of water stops mantle convection.
 - d. none of these.
6. What is created by volcanoes along mid-ocean ridges?
 - a. new oceanic crust
 - b. new continental crust
 - c. hotspots
 - d. none of these
7. How many hot spots are located on Earth
 - a. about 50

- b. about 100
 - c. over 1000
 - d. 1
8. Which of the following is NOT a hotspot?
- a. Hawaii
 - b. Iceland
 - c. Galapagos
 - d. Aleutian Islands
9. The Mid-Atlantic ridge rises above sea level in Iceland because
- a. convection brings extra magma to the volcanoes there
 - b. subduction of oceanic crust and water increases lava
 - c. a hotspot is located at the ridge
 - d. none of these
10. Divergent plate boundaries on land
- a. do not have volcanoes
 - b. often are found with hotspots
 - c. do not occur; they are only found in the oceans
 - d. none of these
11. Hotspots are usually found at
- a. convergent plate boundaries
 - b. divergent plate boundaries
 - c. no plate boundaries
 - d. none of these
12. The oldest volcanoes in a hotspot chain
- a. are furthest from the hotspot.
 - b. may be below sea level.
 - c. may be surrounded by coral reefs.
 - d. all of these.

True or False

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

- _____ 13. Most volcanoes are found in the Himalayan-Asiatic belt.
- _____ 14. Volcanoes erupt because mantle rock melts.
- _____ 15. Yellowstone is one of the few hotspots at a convergent plate boundary.
- _____ 16. All volcanoes are the result of plate tectonics processes.
- _____ 17. Volcanoes occur at convergent plate boundaries.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The Ring of Fire is located around _____.
19. The Ring of Fire is lined with _____ plate boundaries, which leads to volcanism.
20. Large cracks in the ground through which lava erupts are called _____.
21. Volcanoes erupt at mid-ocean ridges along _____ plate boundaries.
22. The volcano that is _____ in age sits directly above a mantle plume.

23. Along a chain of hotspot volcanoes, the volcanoes generally become _____ in size.
24. _____ is the process that leads to the Cascades volcanoes in the Pacific Northwest of the U.S.
25. Where there are lots of volcanoes there are also lots of another natural disaster called _____.

Short Answer

Answer each question in the space provided.

26. How does subduction lead to volcanism?

27. What type of crust are most hotspot volcanoes found on? Why is this the case?

Answer Key

1. b 2. d 3. b 4. c 5. a 6. a 7. a 8. d 9. c 10. d 11. c 12. d
13. false 14. true 15. false 16. false 17. true
18. the Pacific Ocean basin 19. convergent 20. fissures 21. divergent 22. youngest 23. smaller 24. Subduction 25. earthquakes
26. The subducting plate sinks into the mantle and heats up. The plate is topped with sediments with water mixed in. As the plate heats, water lowers the melting point of the mantle above it. The mantle melts and magma rises to erupt at volcanoes above the subducting plate.
27. Most hotspot volcanoes are found on oceanic crust. Continental crust is very thick and so the mantle plume has a harder time penetrating. }

8.2 Volcanic Eruptions

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Each volcanic eruption is unique in its
 - a. style of eruption.
 - b. type of volcanic cone that forms.
 - c. composition of volcanic rocks that form.
 - d. all of these
2. The composition of magma is determined by several things including
 - a. the amount of partial melting of the original rock.
 - b. the eruption style.
 - c. the type of volcano it erupts from.
 - d. none of these.
3. The higher the viscosity of a magma, the higher its content of
 - a. iron
 - b. nickel
 - c. silica
 - d. gases
4. Effusive eruptions
 - a. cause little damage.
 - b. rarely kill anyone.
 - c. have lavas that contain a lot of gas.
 - d. all of these.
5. A volcano that has had no activity for quite a long time is said to be
 - a. active
 - b. extinct
 - c. sleeping
 - d. dormant
6. The style of a volcanic eruption depends on
 - a. the steepness of the volcano's slopes.
 - b. the viscosity of the magma.
 - c. whether the volcano is dormant.
 - d. the location of the volcano.
7. An eruption at a volcano in the Cascades Range could
 - a. shoot a column of ash and gas 30,000 feet into the air.

- b. create a large pyroclastic flow.
 - c. explode and collapse into a caldera.
 - d. all of these.
8. An ash plume from a volcano in Iceland
- a. disrupted air travel across Europe for six days in 2010.
 - b. mixed with pollutants in the atmosphere to cause excess acid rain.
 - c. created pillow lavas offshore.
 - d. created A'a and pāhoehoe lavas offshore.
9. When _____ lava flows under water, it creates _____.
- a. felsic; pillow lavas
 - b. felsic; a'a lavas
 - c. mafic; pillow lavas
 - d. mafic; a'a lavas
10. To see if a volcano will soon erupt, satellites can sense
- a. earthquakes.
 - b. rock fall.
 - c. temperature, deformation and gases.
 - d. nothing; satellites are too high up.
11. A sign that an eruption could soon occur is
- a. a reduction of gas emissions coming from the volcano.
 - b. an decrease in the number and size of earthquakes.
 - c. rocks falling down the volcano's slope.
 - d. all of these.
12. The ability of scientists to predict volcanic eruptions is
- a. excellent in most locations.
 - b. about 50-50.
 - c. an area that needs improvement.
 - d. none of these.

True or False

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

- _____ 13. At least one of the Cascades volcanoes has been actively erupting for at least a century.
- _____ 14. Viscosity is a measure how well a liquid is able to flow.
- _____ 15. Volcanic eruptions in Hawaii tend not to be explosive.
- _____ 16. A recently erupted volcano is said to dormant.
- _____ 17. An increase in earthquake activity is a sign that a volcano may be about to erupt.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Magma and gases collect beneath a volcano in a(n) _____.
19. Magmas with lower silica and more olivine and pyroxene are _____ magmas.
20. A volcano that is not currently erupting, but has erupted recently is said to be _____.
21. A non-explosive volcanic eruption is a(n) _____ eruption.
22. A high speed flow of pyroclastics mixed with water is a _____.

23. The composition of lava most likely to erupt at the surface is _____.
24. Most _____ magmas do not erupt, but cool deeper in the crust.
25. A'a and pāhoehoe lavas are from _____ eruptions.

Short Answer

Answer each question in the space provided.

26. Which composition of magma has the most explosive eruptions? Why?

27. How does the change in shape on a volcano indicate that an eruption may occur soon? Give an example.

Answer Key

1. a 2. a 3. c 4. b 5. b 6. b 7. d 8. a 9. c 10. d 11. c 12. c

13. false 14. true 15. true 16. false 17. true

18. magma chamber 19. mafic 20. dormant 21. effusive 22. lahar 23. mafic 24. felsic 25. effusive

26. Felsic magmas are higher in silica. They have higher viscosity so they do not flow as easily. Dissolved gases are trapped in the thick magma. The pressure builds as the magma churns in the chamber. If the pressure becomes great enough the magma will erupt in a large explosion.

27. Magma and gas fill a magma chamber and push the sides of the volcano upward. This changes the shape of the volcano. Mount St. Helens grew a bulge on its north side before the 1980 eruption. }

8.3 Types of Volcanoes

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The rock composition of composite volcanoes is
 - a. ultramafic to mafic
 - b. mafic to intermediate
 - c. intermediate to felsic
 - d. felsic to ultrafelsic
2. Some volcanoes have steep slopes because
 - a. viscous lava solidifies before it gets far down slope.
 - b. fluid lava solidifies before it gets far down slope.
 - c. mafic magmas form steep piles.
 - d. felsic magmas form steep piles.
3. Lava that is fluid and flows easily creates
 - a. cinder cones
 - b. pyroclastic flows
 - c. composite cones
 - d. shield volcanoes
4. The opening in the top of a composite volcano is a
 - a. hole
 - b. crater
 - c. fissure
 - d. vent
5. Cinder cones usually grow
 - a. from large numbers of fluid lava flows.
 - b. from periodic eruptions of lava and ash.
 - c. rapidly, usually in a single eruption.
 - d. in large, explosive eruptions.
6. Mount St. Helens and Mt. Fuji are both
 - a. shield volcanoes
 - b. supervolcanoes
 - c. composite volcanoes
 - d. cinder cones
7. Yellowstone and Long Valley are similar because they are both
 - a. shield volcanoes

- b. supervolcanoes
 - c. composite volcanoes
 - d. cinder cones
8. A composite volcano has layers of
- a. fluid lava and viscous lava
 - b. viscous lava and ash
 - c. ash and fluid lava
 - d. fluid lava, viscous lava, and ash
9. The two largest supervolcanoes in North America are currently
- a. known mostly for their hot water features
 - b. active
 - c. extinct
 - d. none of these
10. A caldera is created by
- a. a set of fluid lava flows evacuating a magma chamber.
 - b. the earthquakes that accompany a large volcanic eruption.
 - c. a set of ash flows and lava flows building up a flat topped volcano.
 - d. the collapse of a volcano into its magma chamber.

True or False

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

- _____ 11. Composite volcanoes are made of viscous magma.
- _____ 12. The composition of lava in a shield volcano changes over time.
- _____ 13. Magma travels through the volcano to the surface through a pipe.
- _____ 14. Shield volcanoes are the most common type of volcano.
- _____ 15. A volcanic mountain is a mountain that forms when magma is forced upward and flows onto Earth's surface.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The type of rock that shoots up through the air and has holes where gas bubbles once were is _____
17. Magma in supervolcano eruptions tends to be _____ in composition.
18. _____ volcanoes are found on continents near plate boundaries and are very explosive when they erupt.
19. Crater Lake in Oregon is a(n) _____ in old Mount Mazama.
20. Composite volcanoes are made up of layers of lava and _____.
21. The most common volcano type at spreading centers and intraplate hot spots is _____ volcanoes.
22. The U.S. state with the most shield volcanoes is _____
23. A volcano that erupts in enormous, catastrophic eruptions is called a(n) _____

Short Answer

Answer each question in the space provided.

24. Describe the three types of volcanoes that could be erupting right now. How does the composition of the lava cause each one?

25. What is Yellowstone? What might happen if Yellowstone erupts again?

Answer Key

1. c 2. a 3. d 4. b 5. c 6. c 7. b 8. b 9. a 10. d

11. true 12. false 13. true 14. false 15. true

16. pumice 17. felsic 18. composite 19. caldera 20. ash 21. shield 22. Hawaii 23. supervolcano

24. Shield volcanoes are caused by fluid mafic lavas. The lavas flow outward so the slopes are not very steep. Composite volcanoes have felsic lavas. The lavas do not travel far and so the cones are steep sided. Ash eruptions are interspersed with the lava. Cinder cones are small. They can be felsic or mafic but usually are made of cinders from one eruption.

25. Yellowstone is the largest supervolcano in North America. The source of the magma is the Yellowstone hotspot. If Yellowstone erupts again, the ash could block the sun and reduce photosynthesis. If the sun were blocked temperatures would be reduced around the world. Life as we know it might change dramatically. }

8.4 Volcanic Landforms and Geothermal Activity

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Lava domes are created by
 - a. fluid lava that fills a crater.
 - b. viscous lava that does not move far from the vent.
 - c. fluid lava that flows over a large area.
 - d. alternating layers of silica-rich lava and ash.
2. Lava fluid that flows over a large area is called
 - a. a lava plateau
 - b. a lava dome
 - c. a volcano
 - d. a cinder cone
3. Lava domes are created
 - a. along a fissure
 - b. within a crater
 - c. from viscous lava
 - d. all of the above
4. The ocean floor was created by
 - a. sediment eruptions
 - b. cinder cone eruptions
 - c. fissure eruptions
 - d. None of the above
5. What is formed when water comes into contact with hot rock?
 - a. a geyser
 - b. a hot spring
 - c. an earthquake
 - d. a b
6. When lava flows into or erupts into the ocean,
 - a. it creates geysers.
 - b. it creates new land.
 - c. it creates the most explosive eruptions.
 - d. a b
7. A lava plateau is an extensive area of
 - a. mafic igneous rock.

- b. felsic igneous rock.
- c. igneous rock of a wide range of compositions.
- d. viscous lava.

8. The volcanoes that are currently active on Earth are

- a. cinder cones, composite volcanoes, shield volcanoes and supervolcanoes.
- b. composite volcanoes and shield volcanoes.
- c. supervolcanoes.
- d. cinder cones, composite volcanoes, shield volcanoes

9. Fluid lava flows often erupt through a(n)

- a. lava dome
- b. lava plateau
- c. fissure
- d. hotspot

10. In extremely cold winters, the bison in Yellowstone may stay warm near

- a. fissure eruptions.
- b. geysers.
- c. super volcanoes.
- d. lava domes.

True or False

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

- _____ 11. The rock in lava domes is very rich in silica.
- _____ 12. The Big Island of Hawaii is made of one giant shield volcano.
- _____ 13. Shiprock in New Mexico is a lava dome.
- _____ 14. There are thousands of geysers in volcanic areas all around the world.
- _____ 15. The eruptions of some of the geysers in Yellowstone are quite unpredictable.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The most common landforms created by lava are _____.
17. The eruptions that create the seafloor are _____ eruptions.
18. A plug of viscous lava that cools near the vent of a volcano is called a(n) _____.
19. In the Pacific Northwest, the _____ was crated by a series of fluid lava flows.
20. When underground water is heated by hot rock so that it flows to the surface it produces a(n) _____.
21. When hot water erupts at the surface it is as a(n) _____.
22. Igneous _____ beneath volcanoes create volcanic landforms.
23. The most predictable geyser in the world is _____ in Yellowstone.

Short Answer

Answer each question in the space provided.

24. How can volcanic eruptions create an island, like Hawaii?

25. Describe how a geyser is created and why it erupts.

Answer Key

1. b 2. a 3. d 4. c 5. d 6. b 7. a 8. d 9. c 10. b

11. true 12. false 13. false 14. false 15. true

16. volcanoes 17. fissure 18. lava dome 19. Columbia Plateau 20. hot spring 21. geyser 22. intrusions 23. Old Faithful

24. Lava flows go out from a volcano and solidify. On the coast, this can create new beach. A new volcano can emerge from beneath the water to create land. Hawaii is created by shield volcanoes that have emerged from the Pacific and grown together and outward.

25. Water is heated below the surface, but it becomes trapped in a narrow passageway. Heat and pressure build and eventually the pressure grows so great that the water erupts at the surface. }

8.5 Volcanoes

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The Hawaiian islands are found at a(n)
 - a. divergent boundary
 - b. hot spot
 - c. convergent boundary
 - d. transform boundary
2. The most geologically active region in the world is the
 - a. Ring of Fire
 - b. Alps
 - c. Yellowstone Basin
 - d. Himalaya-Asiatic Belt
3. When magma moves beneath a volcano it may cause
 - a. earthquakes
 - b. slope deformation
 - c. an eruption
 - d. all of these
4. Which set of words go together?
 - a. mafic, high viscosity, silica-rich
 - b. felsic, high viscosity, silica-poor
 - c. felsic, high viscosity, silica-rich
 - d. mafic, low viscosity, silica-rich
5. Which set of words go together?
 - a. felsic, composite volcano, lava dome, cinder cones
 - b. mafic, shield volcano, lava dome, cinder cones
 - c. felsic, shield volcano, lava dome, lava plateau
 - d. felsic, shield volcano, lava plateau, cinder cones
6. A volcano that could erupt, but hasn't recently is
 - a. dead
 - b. active
 - c. dormant
 - d. extinct
7. Which type of volcano is Kilauea in Hawaii?
 - a. shield

- b. composite
 - c. cinder cone
 - d. supervolcano
8. What is the most common type of volcano?
- a. shield
 - b. cinder cone
 - c. composite
 - d. supervolcano
9. Scientists think that supervolcano eruptions could have
- a. permanently altered the composition of the atmosphere.
 - b. caused large land areas to fall into the sea.
 - c. changed the directions of plate movement.
 - d. caused mass extinctions.
10. What is created when water is heated beneath the Earth's surface and erupts to the surface through a narrow passageway?
- a. lava plateau
 - b. lava dune
 - c. geyser
 - d. hot spring

True or False

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

- _____ 11. Subduction at the Middle American Trench creates volcanoes in Hawaii.
- _____ 12. Subduction of the Pacific plate into the Aleutian trench creates the Cascades volcanoes.
- _____ 13. Lava erupts through long cracks in the ground called fissures.
- _____ 14. Intraplate volcanoes are found at convergent plate boundaries.
- _____ 15. Volcanoes at divergent plate boundaries create oceanic crust.
- _____ 16. A supervolcano eruption occurs about once per century.
- _____ 17. A large explosive eruption causes more devastation than the force of the atom bomb dropped on Nagasaki at the end of World War II.
- _____ 18. Volcanic gases include sulfur dioxide, carbon dioxide, and water vapor.
- _____ 19. Effusive eruptions are much less deadly than explosive eruptions.
- _____ 20. Each volcano type has a certain lava composition.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. Some volcanic gases can be monitored using _____ .
22. A _____ is a vent through which molten rock and gas escape from the magma chamber.
23. The shape of a volcano is related to the composition of its _____ .
24. Cinder cone volcanoes usually have a _____ at their summit.
25. A _____ must erupt more than 1,000 cubic km of material.
26. The factor that most influences the style of volcanic eruption is the amount of _____ in the lava.

27. Most volcanoes are the result of the process of _____.
28. An explosive eruption may create a _____, a large hole into which the mountain collapses.
29. The Andes Mountains that line South America are at a(n) _____ boundary.
30. _____ are found at divergent plate boundaries as continents break apart.

Short Answer

Answer each question in the space provided.

31. Describe the plate tectonics of the west coast of the United States and Central America. Where are there volcanoes and why? Where aren't there volcanoes and why?

32. Explain how volcanic eruptions are predicted.

33. How can volcanoes be considered constructive? How can volcanoes be considered destructive?

Answer Key

1. b 2. a 3. d 4. c 5. a 6. c 7. a 8. b 9. d 10. c

11. false 12. false 13. true 14. false 15. true 16. false 17. true 18. true 19. true 20. false

21. remote sensing 22. volcano 23. magma 24. crater 25. supervolcanoes 26. silica 27. subduction 28. caldera 29. convergent 30. volcanoes

31. Along the west coast there are volcanoes in the Pacific Northwest due to subduction of the Juan de Fuca Plate beneath North America. There is also subduction of the Pacific Plate into the Middle American trench to create volcanoes in Central America. There are no volcanoes through much of California because there is a transform plate boundary at the San Andreas Fault.

32. Scientists study the history of previous volcanic activities to see how often a volcano erupts. They look for an increase in the number of earthquakes. Before an eruption the slopes of the volcano may undergo deformation and gas emissions change in amount and composition.

33. Volcanic eruptions create large mountains - volcanoes. They create land, where the lava flows into the sea and they add to landscapes like lava domes. Sets of eruptions create lava plateaus. These are all constructive. Volcanic eruptions also are destructive. They can blow the top off a mountain or even a large area of land, like in a supervolcano eruption. }

CHAPTER

9

HS Weathering and Formation of Soil Assessments

Chapter Outline

- 9.1 WEATHERING
 - 9.2 SOILS
 - 9.3 WEATHERING AND FORMATION OF SOIL
-

- The answer keys can be found in the Resource tab above the Table of Contents.

9.1 Weathering

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The process that changes solid rocks into sediments is
 - a. erosion
 - b. transportation
 - c. disintegration
 - d. weathering
2. If pieces of a rock flake off due to extreme temperature differences, it would be
 - a. erosion
 - b. physical weathering
 - c. chemical weathering
 - d. transportation
3. Chemical weathering
 - a. is unrelated to mechanical weathering.
 - b. can go faster when there has been mechanical weathering.
 - c. is slowed down after there has been mechanical weathering.
 - d. none of these
4. If a mineral changes to a different type it has experienced
 - a. erosion
 - b. physical weathering
 - c. chemical weathering
 - d. transportation
5. Minerals undergo chemical weathering because
 - a. they formed under very different pressure and temperature conditions.
 - b. they are exposed to warmer and wetter conditions than where they formed.
 - c. they are broken apart by ice wedging and other physical processes.
 - d. water takes away some of their ions.
6. Leaching occurs when
 - a. rocks collide and their jagged edges smooth.
 - b. carbonic acid dissolves halite.
 - c. oxygen combines with a chemical element.
 - d. water dissolves ions from minerals and transports them away.
7. Weathering by abrasion occurs by agents such as
 - a. wind and water

- b. gravity
 - c. tree roots
 - d. fungus
8. Because carbon dioxide combines with water in the atmosphere
- a. average global temperatures are rising.
 - b. rainwater is a weak acid.
 - c. plants die off.
 - d. the carbon dioxide content of the atmosphere is rising.
9. What are the four agents of erosion?
- a. gravity, soil, landslides, water
 - b. wind, water, landslides, air
 - c. gravity, glaciers, wind, water
 - d. glaciers, gravity, air, soil
10. Important agents of chemical weathering are
- a. oxygen, sulfur, nitrogen and carbon
 - b. oxygen, carbon dioxide, and water
 - c. water, wind, and glaciers
 - d. water, sulfur, nitrogen and carbon
11. Plants increase chemical weathering by
- a. increasing the temperature in the local area.
 - b. emitting water into the ground.
 - c. emitting oxygen into the local atmosphere.
 - d. using nutrients that were formerly part of a mineral.
12. If temperature increases by 10°C, the rate of chemical reactions will
- a. increase by twice
 - b. decrease by twice
 - c. increase by 10 times
 - d. decrease by 10 times

True or False

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

- _____ 13. Oxidation is the reaction between a chemical compound and water.
- _____ 14. Plate tectonics build, weathering destructs.
- _____ 15. All rocks weather at the same rate.
- _____ 16. Abrasion is a type of chemical weathering.
- _____ 17. Water can dissolve salt.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. _____ weathering creates new minerals that are stable at surface conditions.
19. A metal rusts when _____ occurs.
20. Weathering by the expansion and contraction of ice is known as _____.
21. _____ is the process of hydrogen ions replacing the cations of a mineral.
22. The process that moves sediments is _____.

23. Limestone is a rock that dissolves in _____.
24. Chemical weathering increases as temperature _____ and precipitation _____.
25. Weathering can concentrate valuable minerals, such as bauxite, society's main source of _____.

Short Answer

Answer each question in the space provided.

26. Shiprock, in New Mexico, is the neck of an old volcano. Why does Shiprock stand above the surrounding desert?

27. Describe the climate type that causes the greatest rate of weathering. What factors cause the weathering rate to be high?

Answer Key

1. d 2. b 3. b 4. c 5. a 6. d 7. a 8. b 9. c 10. a 11. d 12. a
13. false 14. true 15. false 16. false 17. true
18. chemical 19. oxidation 20. ice wedging 21. hydrolysis 22. erosion 23. weak acid or acid 24. increases, increases
25. aluminum
26. The magma that cooled in the volcano is very hard and resistant to erosion. The rock that was around the igneous rock was more easily eroded. This left Shiprock standing out in the desert.
27. A warm, wet climate has the highest rate of weathering. Warmer temperatures have faster chemical reactions: an increase in 10°C causes a doubling of the reaction rate. Water is a weathering agent, so a wet climate will have faster weathering. Warm, wet areas are conducive to plant growth and plants increase the rate of weathering. }

9.2 Soils

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Topsoil is dark in color because it
 - a. undergoes a lot of chemical weathering.
 - b. is full of dark, mafic rocks.
 - c. has a large amount of organic material.
 - d. contains a lot of worms.
2. The soils of the eastern U.S., where annual rainfall is pretty high and there are deciduous forests is called
 - a. pedocal
 - b. laterite
 - c. pedalfers
 - d. weathered soil
3. Rainforest soils are
 - a. thick and nutrient rich.
 - b. thick and nutrient poor.
 - c. thin and nutrient rich.
 - d. thin and nutrient poor.
4. Removing vegetation
 - a. increases soil fertility.
 - b. decreases soil salinity.
 - c. increases soil erosion.
 - d. decreases soil thickness.
5. Adding organic material to soil
 - a. improves its ability to contain water and nutrients.
 - b. decreases its fertility.
 - c. increases the soil's A horizon.
 - d. often kills off existing vegetation.
6. Partially altered bedrock is
 - a. called transported soil
 - b. the C horizon.
 - c. the B horizon
 - d. the A horizon
7. Farmers terrace hillsides to
 - a. eliminate the soil's C horizon.

- b. increase the types of crops they can grow.
 - c. increase the creation of soil.
 - d. reduce erosion.
8. Thicker soils form when there is a
- a. longer time for weathering.
 - b. steeper slope.
 - c. drier climate.
 - d. colder climate.
9. Planting crops in alternating bands, one of which is a cover crop that slows rain runoff.
- a. contour plowing
 - b. strip-cropping
 - c. terracing
 - d. crop rotation
10. Plowing soil in curved bands that follow the shape of the land, thus preventing soil from flowing directly down slopes.
- a. contour plowing
 - b. strip-cropping
 - c. terracing
 - d. crop rotation
11. Soil made from the bedrock that lies beneath it is
- a. transported soil
 - b. eroded soil
 - c. residual soil
 - d. weathered soil
12. Soil scientists study the layers of soil that together are called
- a. transported soil
 - b. residual soil
 - c. soil horizons
 - d. a soil profile

True or False

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

- _____ 13. Steep slopes are more likely to erode compared to flat surfaces.
- _____ 14. Permeable soil allows water to flow through the soil easily.
- _____ 15. All soils contain organic material.
- _____ 16. Chemical erosion is most common in deserts.
- _____ 17. Pedocal soils form in regions covered with grasslands and brush.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The top layer of Earth's surface that contains a mixture of weathered rocks, minerals and organic material is known as the _____.
19. The _____ is the organic portion of soil.
20. The organic portion of soil is important because it provides the _____ needed for plant growth.

21. A, B & C are complete soil layers or _____.
22. The _____ is where leached materials accumulate.
23. _____ contains humus, plant roots and living organisms.
24. A _____ soil is typically red because of high iron content.
25. Soil is a(n) _____ resource.

Short Answer

Answer each question in the space provided.

26. Describe the effect of climate on soil formation.

27. What is humus? Why is it a very important part of most soils?

Answer Key

1. c 2. c 3. b 4. c 5. a 6. b 7. d 8. a 9. b 10. a 11. c 12. d
13. true 14. true 15. false 16. false 17. true
18. topsoil 19. humus 20. nutrients 21. soil horizons 22. subsoil or B horizon 23. topsoil 24. laterite 25. renewable
26. Climate is the most important factor determining soil formation. More rain leads to more chemical reactions for more chemical weathering. More rain also causes leaching. Warmer regions have more reactions and so soils are thicker.
27. Humus is the decayed remains of plants and animals. Humus binds sediments together to create a structure. This increases the soils porosity and helps it to hold water. Humus helps to buffer acidity. Humus helps the soil to hold nutrients, which increases its fertility and helps plants to grow. }

9.3 Weathering and Formation of Soil

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Where is ice wedging the primary form of mechanical weathering?
 - a. beneath glaciers where the ground is perpetually frozen
 - b. where salt enters cracks in rock and expands
 - c. where the temperature is often right around freezing
 - d. in exposed areas where the temperature stays below freezing most of the year
2. Abrasion describes when
 - a. sediments settle in water.
 - b. sediments break off a parent rock in angular fragments.
 - c. plant roots grow into a crack and break the rock.
 - d. rocks bump against each other.
3. What is the most important agent of chemical weathering?
 - a. water
 - b. carbon dioxide
 - c. oxygen
 - d. acid rain
4. Chemical weathering effects are magnified when
 - a. carbon dissolves rock.
 - b. sulfur and nitrogen create acids in the atmosphere.
 - c. water breaks into ions that dissolve rock.
 - d. none of these
5. Iron undergoes oxidation to create
 - a. rust
 - b. iron sulfate
 - c. ironic acid
 - d. none of these
6. The climate that produces the lowest rate of weathering is
 - a. hot and wet
 - b. hot and dry
 - c. cold and wet
 - d. cold and dry
7. To classify soil by type, soil scientists
 - a. measure the amount of humus.

- b. measure the proportions of particles of different sizes.
 - c. measure the depth of the three soil horizons.
 - d. none of these.
8. What is the darkest layer of soil?
- a. A Horizon
 - b. B Horizon
 - c. C Horizon
 - d. none of these
9. What type of soil is found in tropical rainforests?
- a. pedocal
 - b. pedalfer
 - c. laterite
 - d. none of these
10. For soil to be a renewable resource it must be
- a. kept exposed to weather and other natural processes.
 - b. exposed to oxygen so it can undergo oxidation.
 - c. protected from erosion.
 - d. all of these

True or False

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

- _____ 11. Weathering and erosion can turn tall mountains into hills and even plains.
- _____ 12. The Appalachian mountains along eastern North America were once as tall as the Himalayas.
- _____ 13. The steeper the slope, the thicker a soil will be.
- _____ 14. Oxidation is a chemical reaction that occurs when oxygen reacts with another element.
- _____ 15. Soil is a complex mixture of different materials.
- _____ 16. Residual soils form in one place but have been transported to somewhere else.
- _____ 17. Soil is not permeable; water runs off soil into larger water bodies.
- _____ 18. Rotating crops helps keep the soil fertile season after season.
- _____ 19. Plowing along the contours of a field makes no difference to soil conservation.
- _____ 20. Adding compost to the soil improves its fertility and its ability to hold water and nutrients.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. _____ is the process that changes solid rock into sediments.
22. _____ moves broken pieces of rock, large or small downslope.
23. The chemical reaction between a chemical compound and water is called _____.
24. _____ is determined by the temperatures of a region plus the amount of precipitation it receives.
25. Sediments can be _____ into an area by glaciers, wind, water, or gravity.
26. The decayed remains of plant and animal life are called _____.
27. When soil contains a mixture of grain sizes, the soil is called _____.
28. _____ is a very fertile, dark brown soil common in many temperate areas of the eastern United States.

29. _____ soil is formed in drier temperate areas here grasslands and brush are the usual type of vegetation.
30. Under ideal conditions, soil forms at the rate of _____ mm/year .

Short Answer

Answer each question in the space provided.

31. List 3 factors that can lead to increased weathering and greater soil formation.
32. Explain how ice wedging works.
33. In the tropics, rainforests are stripped of trees to make room for farmland. Yet, the soils beneath those trees are not good for crops. Why not?

Answer Key

1. c 2. d 3. a 4. b 5. a 6. d 7. b 8. a 9. c 10. c
11. true 12. true 13. false 14. true 15. true 16. false 17. false 18. true 19. false 20. true
21. weathering 22. erosion 23. hydrolysis 24. climate 25. transported 26. humus 27. loam 28. pedalfer 29. pedocal
30. 1
31. Possible answers:

- More rain equals more chemical reactions to weather minerals and rocks. Those reactions are most efficient in the top layers of the soil where the water is fresh and has not yet reacted with other

materials.

- Increased rainfall increases the amount of rock that is dissolved as well as the amount of material

that is carried away by moving water. As materials are carried away, new surfaces are exposed, which also increases the rate of weathering.

- Increased temperature increases the rate of chemical reactions, which also increases soil formation.
- In warmer regions, plants and bacteria grow faster, which helps to weather material and produce

soils. In tropical regions, where temperature and precipitation are consistently high, thick soils form. Arid regions have thin soils.

32. Water seeps into rocks and at night as temperatures drop, it freezes. When water freezes, it expands causing the rock to break apart as this process is repeated over and over again.

33. In the tropics, warm rain falls daily. By chemical weathering, the rain leaches the soluble nutrients from the soils. The unsoluble materials are left behind, including aluminum and iron oxides. There is no humus. When the soils are exposed to the sun, they bake hard. Hard nutrient-poor soils do not make very good farmland. }

CHAPTER 10 HS Erosion and Deposition Assessments

Chapter Outline

- 10.1 WATER EROSION AND DEPOSITION
 - 10.2 WAVE EROSION AND DEPOSITION
 - 10.3 WIND EROSION AND DEPOSITION
 - 10.4 GLACIAL EROSION AND DEPOSITION
 - 10.5 EROSION AND DEPOSITION BY GRAVITY
 - 10.6 EROSION AND DEPOSITION
-

- The answer keys can be found in the Resource tab above the Table of Contents.

10.1 Water Erosion and Deposition

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Stream water
 - a. erodes, but does not deposit.
 - b. erodes and deposits.
 - c. deposits, but does not erode.
 - d. does not deposit or erode.
2. A stream overflows its banks onto its
 - a. base level
 - b. alluvial plain
 - c. delta
 - d. flood plain
3. Flooding can wipe out farms and even towns when
 - a. an earthquake lowers the elevation of the farms and towns.
 - b. the natural levees get too high.
 - c. the farms and towns are placed on a floodplain.
 - d. concrete allows the stream water to run off.
4. As a stream exit a canyon into open land, the sediments form a(n) _____.
 - a. alluvial fan
 - b. fluvial fan
 - c. sediment fan
 - d. fan
5. A stream's competence is highest when
 - a. its gradient is nearly flat and it moves slowly
 - b. it has a higher dissolved load
 - c. it cannot carry a sediment load
 - d. it has a steep gradient and faster velocity
6. If a stream's competence increases it is likely that
 - a. the amount of water in the stream has increased.
 - b. the stream's gradient has increased.
 - c. either a or b, or both a and b
 - d. a and b together
7. In a meander, the stream
 - a. erodes at the inside of the bend, and deposits at the outside of the bend.

- b. deposits at the inside of the bend, and erodes at the outside of the bend.
 - c. erodes all along the meander, inside and outside.
 - d. deposits all along the meander, inside and outside.
8. Tiny particles in a stream that can be carried in solution are known as _____.
- a. dissolved load
 - b. suspended load
 - c. bed load
 - d. fluvial load
9. In an area known for placer gold, where would you begin to pan?
- a. Inside a meander bend.
 - b. Outside a meander bend.
 - c. Anywhere along a meander.
 - d. Anywhere along the stream
10. A sinkhole forms
- a. when the roof of a lava tube collapses and fills with water.
 - b. when glaciers gouge out a hole in the ground that fills with water.
 - c. when the roof of a limestone cave collapses and fills with water.
 - d. when ice trapped in glacial sediment melts and makes a pond.
11. A river erodes most deeply when
- a. it is at its base level.
 - b. it is meandering across a plain.
 - c. it is farthest from its base level.
 - d. it is carrying a lot of sediment.
12. A stalagmite rises up from the floor of a cave because
- a. water comes through the cave's floor and up.
 - b. water drips down from the ceiling.
 - c. a column breaks into two features, one down from the ceiling, one up from the floor.
 - d. none of these

True or False

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

- _____ 13. Streams always flow to lower elevations
- _____ 14. Meanders are curves in the stream's path.
- _____ 15. Flowing water does the work of erosion, but not deposition.
- _____ 16. Dissolved load consists of teeny, tiny sediment particles.
- _____ 17. Rainwater is a weak acid due to carbon dioxide in the atmosphere.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Moving water below the surface is called _____.
19. Sediment that is bumped and pushed along the stream bottom is said to move by _____.
20. As a stream traverses flat land, it tends to _____.
21. A circular hole formed when the roof of a cave collapses and filled with water is called a(n) _____.
22. A(n) _____ forms where a stream meets a large body of standing water.

23. The stream that carries the largest particles has the highest _____.
24. Streams build natural levees during _____
25. A(n) _____ is a cave feature that comes down from the ceiling.

Short Answer

Answer each question in the space provided.

26. Briefly describe the ways that streams carry sediments.

27. What happens to the sediment load if a stream goes from normal flow to flood stage?

Answer Key

1. b 2. d 3. c 4. a 5. d 6. c 7. b 8. a 9. a 10. c 11. c 12. b
13. true 14. true 15. false 16. false 17. true
18. groundwater 19. saltation 20. meander 21. sinkhole 22. delta 23. competence 24. floods 25. stalactite
26. Dissolved load is ions in solution. Suspended load is solid particles that are small enough to stay up in the flowing water of the stream. Bed load is solid sediments that are too heavy to be carried up in the water flow and are bumped and pushed along the stream bed.
27. As a stream's flow increasing dramatically, its competence increases. It will be able to carry more and larger sediments, meaning that it will engage in erosion. If the stream overflows its banks, it will drop some of the sediment at the top of its channel, creating natural levees. The smaller sediments will spread over the floodplain and be dropped there. }

10.2 Wave Erosion and Deposition

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A wave is _____ that passes through a material.
 - a. speed
 - b. energy
 - c. motion
 - d. water
2. Beaches are formed when
 - a. waves deposit sediments along the coast
 - b. waves carry sediments to sea
 - c. humans erect sea walls
 - d. tides rise
3. Erosion from waves produces which of the following:
 - a. cliffs
 - b. sea stacks
 - c. arches
 - d. all of the above
4. Beaches often appear as a straight line because
 - a. wave energy focuses on areas that stick out and erodes them more.
 - b. waves focus the same amount of energy all along the beach.
 - c. ocean currents move sand so that the beach is a straight line.
 - d. seawalls built offshore protect sand in straight lines.
5. The “bending” of a wave is called
 - a. reflection
 - b. refraction
 - c. refinement
 - d. reinforcement
6. What feature is produced when waves erode through a cliff?
 - a. tower
 - b. heel
 - c. arch
 - d. bridge
7. Where wave action is quiet,
 - a. sea stacks form.

- b. erosion and deposition of sediment are equal.
 - c. erosion increases.
 - d. sediment is deposited.
8. Large waves form when
- a. strong winds blow steadily over a large region of the ocean.
 - b. gusts of wind blow over a large region of the ocean.
 - c. strong winds blow just offshore.
 - d. gusts of wind blow just offshore.
9. An ocean wave undergoes refraction because
- a. the bottom of the wave is going more rapidly than the top of the wave.
 - b. the top of the wave is going more rapidly than the bottom of the wave.
 - c. the inshore part of the wave goes more slowly so the wave bends.
 - d. the offshore part of the wave goes more slowly so the wave bends.
10. If waves erode the base of a cliff
- a. the cliff will collapse
 - b. they will erode a wave-cut platform
 - c. they will create a sea arch
 - d. they will create a delta
11. If a river carries sediment to the shore and wave action is high
- a. a delta forms
 - b. an alluvial fan forms
 - c. the sand runs back up river
 - d. sand spreads along the beach
12. A structure built perpendicular to a beach that traps sand is a
- a. breakwater
 - b. seawall
 - c. groin
 - d. spit

True or False

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

- _____ 13. Wave energy is dispersed in areas such as bays.
- _____ 14. Waves have higher energy in the summer than the winter.
- _____ 15. Waves continually move sand along the shore.
- _____ 16. A spit is sand feature that is not connected to land
- _____ 17. Beaches are made from mineral grains and shell, but not coral pieces.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. _____ built along the shore, collect sediments, but deprive the shore down current of sediments.
19. A(n) _____ is formed when a wave breaks through the bottom part of a rock, but leaving the upper section in tacts.
20. When a sea arch collapses, all that is left is a(n) _____.
21. A(n) _____ is a long, narrow sandbar that forms along the shore.

22. There is more sand on a beach in the _____ season because the waves have _____ energy.
23. Between a barrier island and the mainland is a(n) _____.
24. In its natural state, a(n) _____ defends a shoreline from storms.
25. As compared with a _____, which is built onshore, a _____ protects a beach and is built offshore.

Short Answer

Answer each question in the space provided.

26. Briefly describe the erosional features produced by ocean waves.

27. Hurricane Sandy in November 2012 destroyed a lot of property located near the beaches of New Jersey and New York. Given that sea level is rising, what can communities do to prepare for the next storm? Consider all options.

Answer Key

1. b 2. a 3. d 4. a 5. b 6. c 7. d 8. a 9. c 10. a 11. d 12. c
13. true 14. false 15. true 16. false 17. false
18. groins 19. arch 20. sea stack 21. spit 22. summer; lower 23. lagoon 24. barrier island 25. seawall; breakwater
26. Waves erode land that sticks out into the water, which creates a wave-cut cliff. When a beach area is eroded flat and uplifted, it creates a wave cut platform. When a cliff is eroded through, it crests an arch. if that arch collapses, it make sea stacks.
27. Some areas are barely above sea level so during a storm there is a big chance that beach areas will be flooded. The most sensible thing might be to abandon those areas that are too exposed. Returning barrier islands to their natural state and letting them protect the beaches inland from them is also sensible. Since that isn't practical, breakwaters and sea walls can be built to protect the land from incoming waves. }

10.3 Wind Erosion and Deposition

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Wind as an erosional force is
 - a. stronger than water as an erosional force.
 - b. equally important in all the climate zones.
 - c. dependent on the wind strength and the size of particles.
 - d. all of these
2. Beach dunes are usually made of
 - a. quartz
 - b. marble
 - c. clay
 - d. calcium carbonate
3. Silt and clay blown over large areas are called
 - a. dunes
 - b. plains
 - c. loess
 - d. plateaus
4. The steep side of a sand dune is called
 - a. slip face
 - b. steep face
 - c. face
 - d. cross bed
5. Three examples of wind erosion are
 - a. sand storms, deflation, abrasion
 - b. abrasion, erosion, dunes
 - c. dunes, deflation, abrasion
 - d. abrasion, glacial, dunes
6. In a sandstorm, most sand
 - a. rolls along on the ground.
 - b. blows up very high; as much as 100 feet.
 - c. blows within a meter of the ground.
 - d. blows in spirals, like in a tornado.
7. Sandstorms are more common in arid regions than in humid regions because
 - a. desert sands are weathered to a good size for wind to pick up.

- b. water and vegetation in humid areas hold the sediments down.
 - c. winds are more common and stronger in deserts.
 - d. actually, the open spaces of deserts just makes it seem like they're more common.
8. Desert varnish is a type of
- a. mechanical weathering.
 - b. erosion.
 - c. sandstorm effect.
 - d. chemical weathering.
9. A sand dune's shape is
- a. the same on both sides.
 - b. steeply sloping on the downwind side and gently sloping on the upwind side.
 - c. gently sloping on the downwind side and steeply sloping on the upwind side.
 - d. random in most cases.
10. Mud in the ocean is formed partly of
- a. fine silts and clays blown out from land.
 - b. volcanic ash.
 - c. particles that settle from the surface to the seafloor.
 - d. all of these.
11. Parabolic dunes form in
- a. long straight lines parallel to the wind direction.
 - b. arc shapes that curve in the wind direction.
 - c. U-shapes that curve in the wind direction.
 - d. star-shapes that point in the various directions the wind is blowing.
12. Loess deposits form
- a. where sand-sized sediments are common.
 - b. in oceans.
 - c. in deserts.
 - d. where fine sediments are present.

True or False

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

- _____ 13. Wind can carry small cobbles, sand, silt and clay.
- _____ 14. Where quartz sands make up dunes, calcium carbonate has weathered into clay.
- _____ 15. Sand dunes have the same slope on both sides.
- _____ 16. Loess deposits are wastelands for crops and other vegetation.
- _____ 17. Wind erosion makes desert pavement.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Extremely fine-grained, wind-borne deposit of silts and clays; forms nearly vertical cliffs is called a(n) _____.
19. Wind lifts sand just above the surface and bounces it along by _____.
20. A rock or surface that has been sandblasted by blowing sand is a(n) _____.
21. Wind-blown sediments are usually rounded by the process of _____.

22. Long dunes that form parallel to the wind direction are _____.
23. Ancient sand dunes display a very distinctive structure known as _____.
24. A surface of rocks formed because smaller sediments are blown away is called _____.
25. Sediment that is rolled along by wind is transported by _____.

Short Answer

Answer each question in the space provided.

26. How do sand dunes form?

27. Why are dune sands composed of sands that are the same sizes and shapes?

Answer Key

1. c 2. a 3. c 4. a 5. a 6. c 7. b 8. d 9. b 10. d 11. b 12. d

13. false 14. true 15. false 16. false 17. true

18. loess 19. saltation 20. ventifact 21. abrasion 22. linear 23. cross-bedding 24. desert pavement 25. creep or bed load

26. An obstacle, such as a rock or a bush, causes the wind near the ground to slow and it drops its sand. This continues. When there is a pile of sand, as the wind moves up the dune it increases speed, moving sand grains by saltation. As it goes over the top, it decreases speed and drops its sand. The sand slides down the dune; this is known as the slip face.

27. Very small particles, like silts and clays, are difficult for the wind to pick up so they are usually left on the ground. Large particles are also difficult for the wind to pick up. So it is sand-sized particles that are blown. The grains are rounded since rounded grains roll more easily than angular grains. }

10.4 Glacial Erosion and Deposition

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Apart from water and gravity, other erosive agents are
 - a. ice and wind
 - b. animals and machinery
 - c. glaciers and people
 - d. all of the above
2. Valley or alpine glaciers cover what type of ground?
 - a. flat land
 - b. mountains
 - c. valleys
 - d. coastal
3. Glaciers cover how much of the Earth's surface?
 - a. about 30%
 - b. less than 1%
 - c. over 40%
 - d. about 10%
4. Glaciers make valleys in the shape of what letter?
 - a. V
 - b. U
 - c. C
 - d. W
5. Long parallel grooves in the bedrock from glaciers are called:
 - a. bedrock striations
 - b. glacial grooves
 - c. glacial striations
 - d. None of the above
6. The ice in continental glaciers
 - a. flows outwards from where the snow accumulates.
 - b. flows down valleys from higher land areas.
 - c. forms a solid cap that does not move.
 - d. none of these.
7. A boulder dumped by a glacier is called a(n)
 - a. erratic

- b. arête
 - c. roche moutonnée
 - d. none of these
8. Three or more cirques carved into the top of a mountain create a(n)
- a. horn
 - b. hanging valley
 - c. arête
 - d. moraine
9. Glacial till that is sorted
- a. was deposited by multiple advances and retreats of a glacier.
 - b. was deposited as ground moraine.
 - c. was re-transported by melt water.
 - d. none of these
10. A lake that forms when a block of ice melts in glacial till is a(n)
- a. tarn
 - b. kettle
 - c. varve
 - d. terminal lake
11. Varves
- a. form in lakes in warm climates.
 - b. have dark clays that are deposited in spring runoff.
 - c. have light sands that are deposited in winter.
 - d. can be used to understand the annual cycle of a lake.
12. A glacier is retreating if it
- a. moves quickly down its valley.
 - b. becomes stagnant in place.
 - c. accumulates less snow in a year than melts off.
 - d. none of these.

True or False

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

- _____ 13. Glaciers move very fast, up to 80 mph.
- _____ 14. A continent that is covered by ice is said to be under an ice sheet.
- _____ 15. Glaciers erode the underlying rock by plucking.
- _____ 16. During the most recent ice ages, nearly the entire planet was covered with glaciers.
- _____ 17. Glaciers are disappearing at an increased rate.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Thick layer of sediment deposited under a glacier is called a(n) _____.
19. Yosemite Valley was cut by large _____ glaciers.
20. Greenland is a large landmass that is covered by a(n) _____.
21. Rocks pulled from the walls up high on a mountain create a(n) _____.
22. Bridal Veil Falls in Yosemite National Park flows down from a(n) _____.

23. A(n) _____ is found as tributary and main glaciers meet.
24. _____ occurs glacial melt water seeps into cracks, freezes, breaks off pieces of bedrock, and then transported by the glacier.
25. Features that point in the direction the glacier moved are _____.

Short Answer

Answer each question in the space provided.

26. List and describe three geological features that are the result of erosion by glaciers.

27. List and describe three geological features that are the result of deposition by glaciers.

Answer Key

1. d 2. b 3. d 4. b 5. c 6. a 7. a 8. a 9. c 10. b 11. d 12. c
13. false 14. true 15. true 16. false 17. true
18. ground moraine 19. alpine or valley 20. continental glacier or ice sheet 21. cirque 22. hanging valley 23. medial moraine 24. plucking 25. glacial striations
26. See text for descriptions. Choices include U-shaped valley, cirque, tarn, glacial striations, hanging valley, horn, and arête.
27. See text for descriptions. Choices include glacial erratics, glacial till, moraines (lateral, medial, ground, terminal, end), esker, drumlin, till, stratified drift, kettle lake }

10.5 Erosion and Deposition by Gravity

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The rate of erosion by gravity
 - a. is sudden and dramatic.
 - b. is very slow over long periods of time.
 - c. neither of these.
 - d. either of these.
2. Deposition is governed by which of the following?
 - a. pressure
 - b. gravity
 - c. chemical energy
 - d. potential energy
3. How fast can landslides move?
 - a. up to 30 km per hour
 - b. up to 100 km per hour
 - c. up to 300 km per hour
 - d. up to 1,000 km per hour
4. When a rock falls from a cliff face, the agent of erosion is
 - a. wind
 - b. water
 - c. gravity
 - d. glaciers
5. The weather conditions most likely to produce landslides is
 - a. years of almost non-stop rain.
 - b. years of drought followed by abundant rain.
 - c. years of normal weather in a semi-arid climate.
 - d. years of drought.
6. A lahar flows down
 - a. any type of volcano.
 - b. any type of igneous rock feature.
 - c. a composite volcano.
 - d. any hillside with snow melt or rainwater.
7. Logging a hillside makes it
 - a. less likely to experience mass movements due to gravity.

- b. vulnerable to mass movements by gravity.
 - c. unchanged in its chance of having mass movements.
 - d. none of these
8. Soil that moves very slowly downhill
- a. results in curved tree trunks.
 - b. falls as a whole unit.
 - c. leaves large scars in the hillside.
 - d. cannot be noticed because it is so slow.
9. The rock that is most likely to have landslides is
- a. clay that can become wet and slippery.
 - b. solid rock that can break and fall.
 - c. igneous or metamorphic rock that can change and then fall.
 - d. any type; the type of rock doesn't affect the chance of landslide.
10. To keep a slope from having a landslide, you should
- a. build a retaining wall to hold up soil.
 - b. plant vegetation to hold soil in place.
 - c. install pipes so the excess water is drained.
 - d. all of these.

True or False

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

- _____ 11. Curved tree trunks are a sign of land creep.
- _____ 12. Undercutting can cause the ground to become unstable.
- _____ 13. Landslides cause an average of \$1 million to \$2 million of damage in the U.S. each year.
- _____ 14. Landslides can cause earthquakes.
- _____ 15. A lahar occurs from the erosion caused by a glacier.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. A large block that moves along a curved surface is a(n) _____.
17. The movement type in #16 above is often caused by _____.
18. As snow accumulates on a mountain, the risk of a(n) _____ increases.
19. Slow mass wasting is referred to as _____.
20. Rockfall at the base of a cliff makes a(n) _____.
21. Sand on a beach cliff may fall when it is undercut by _____.
22. A landslide that falls into a lake or bay may cause a _____.
23. A flow of volcanic ash mixed with melted snow is a(n) _____.

Short Answer

Answer each question in the space provided.

24. How does the amount of rain that falls on a slope affect the chances that there will be a landslide?

25. Some day you may want to buy a house on a hillside. Describe the three signs should you look for to see if landslides are a problem in that area.

Answer Key

1. d 2. b 3. c 4. c 5. b 6. c 7.b 8.a 9.a 10.d

11.true 12.true 13.false 14.false 15.false

16. slump 17. undercutting 18. avalanche 19. creep 20. talus slope 21. waves 22. tsunami 23. lahar

24. A little bit of rain holds soil together. More rain falling on saturated soil will cause the soil to flow away. When snow melts rapidly or a lot of rain falls, the extra water causes the slope to weigh more and also lubricates the sediment grains so flow is more likely.

25. Look for cracks or bulges in the hillside. Sticking windows and doors may indicate ground movement. Look for scars in the hillside where previous landslides have fallen. }

10.6 Erosion and Deposition

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What is created when large sediments build a higher area around the edges of the stream channel?
 - a. meander
 - b. headwater
 - c. natural levees
 - d. none of the above
2. What is a curve in a stream channel called?
 - a. meander
 - b. headwater
 - c. natural levees
 - d. none of the above
3. Stalactites forms when what drips from the ceiling of a cave?
 - a. water
 - b. sulfuric acid
 - c. calcium carbonate
 - d. carbonic acid
4. The bending of waves is called
 - a. reflection
 - b. refraction
 - c. deflation
 - d. none of the above
5. What is produced when waves erode through a cliff?
 - a. a wave-cut platform
 - b. a wave-cut cliff
 - c. an arch
 - d. a sea stack
6. What is a long, narrow pile of rocks built perpendicular to the shoreline in order to keep sand on the beach called?
 - a. breakwater
 - b. barrier island
 - c. sea wall
 - d. groin
7. Stones that have become polished and faceted due to the abrasion by sand particles is called

- a. desert varnish
 - b. ventifacts
 - c. sand dunes
 - d. deflation
8. Which of the following is windblown silt and clay deposited layer upon layer over a large area called?
- a. sand
 - b. slipface
 - c. soil
 - d. loess
9. How much of the Earth is covered in glaciers?
- a. 5%
 - b. 10%
 - c. 15%
 - d. 20%
10. What are large ice sheets that cover relatively flat ground called?
- a. continental glaciers
 - b. alpine glaciers
 - c. valley glaciers
 - d. none of the above

True or False

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

- _____ 11. Flowing water does the work of both erosion and deposition.
- _____ 12. Faster streams can only carry smaller particles.
- _____ 13. A sinkhole form if a cave's roof collapses.
- _____ 14. Barrier islands act as the first line of defense against storms if they are undeveloped.
- _____ 15. Desert pavement is a surface covered by clay that is easily moved by wind.
- _____ 16. Crossbeds are created when wind blows only in one direction.
- _____ 17. Loess deposits make very fertile soils in many regions.
- _____ 18. Plucking is the abrasion of rocks by glaciers.
- _____ 19. Geologists study moraines to determine when the next ice age will occur.
- _____ 20. Landslides are the most dramatic, sudden and dangerous example of earth materials moved by gravity.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. A flat level area surrounding the stream channel is called a _____.
22. A stream deposits its sediments in a wide triangular-shaped deposit called a _____.
23. A _____ is the level area formed by wave erosion as the waves undercut cliffs.
24. Waves spread the sediments along a coastline to create a _____.
25. A _____ is formed as wind passes over a dune and sand cascades down the crest.
26. _____ is the erosional agent that is responsible for the most erosion.
27. Rocks carried by glaciers can scratch deeply into underlying bedrock making long, parallel grooves called _____.

28. Linear deposits of rock that were dumped by a glacier are called _____.
29. _____ are the very dramatic and sudden movement of earth downhill while _____ are the same but involving snow.
30. _____ is the extremely gradual movement of soil downhill.

Short Answer

Answer each question in the space provided.

31. Describe the course a stream takes, from its beginning in the mountains, to its ending in the ocean. Integrate as many concepts from this section in as you can. (Just talk about the flow of water?)

32. Briefly describe the depositional features produced by ocean waves.

33. How do sand dunes move?

34. Yosemite Valley was carved by glaciers. Some of the notable features are a large valley, waterfalls and steep cliffs. The rocks that make up the area have grooves; there are boulders sitting around. Describe how glaciers created these features.

35. List the factors that cause a landslide to occur.

Answer Key

1. c 2. a 3. c 4. b 5. c 6. d 7. b 8. d 9. b 10. a

11. true 12. false 13. true 14. true 15. false 16. false 17. true 18. false 19. false 20. true

21. floodplain 22. delta 23. wave cut platform 24. beach 25. slip face 26. water 27. glacial striations 28. moraines
29. landslide; avalanche 30. creep

31. A stream begins in its headwaters in the mountains. Snow melt and rain contribute to starting the water. The gradient is steep and the stream can carry a lot of sediments and larger sediments. As the stream leaves the mountains and the gradient becomes less steep, the stream slows. It drops its heavier sediments and continues across the flatter area. Some streams will meander. Finally, the stream will reach the ocean. The streams velocity will drop to zero and it will drop its sediments. The shape of this deposit is ordinarily a delta.

32. Waves spread sediments along a coastline to create beaches. Waves may move the sand so that it extends outward from the land, creating a spit. If the spit has a hook, it is a tombolo. The sand may collect offshore with a lagoon between the sand and the mainland. This is a barrier island.

33. Once a sand dune exists it is an obstacle for wind. As the wind, goes over the top of the dune, it decreases speed and drops its sand. The sand slides down the slip face of the dune. This means that sand is being deposited in the direction the wind is moving. Moving sand from the windward to the leeward side causes the dune to slowly migrate.

34. There was a large glacier that carved the main valley. Plucking created a U-shaped valley. Tributary glaciers were cut off by the main glacier. They created small U-shaped valleys, but when the glaciers melted, the valleys were hanging valleys. Water now flows down the steep cliffs to create waterfalls. The glaciers had rocks at their bases, so they left glacial striations as they moved. When the glaciers melted back, they dropped boulders, creating glacial erratics.

35. Some possible factors:

- Water – rapid snow melt and/or excessive precipitation can increase the weight of the load.
- Rock type – layers of weak rock allow for more landslides.
- Undercutting – human digging into the base of a slope to create a road or home site.
- Ground shaking – an earthquake, volcanic eruption, or traffic can shake unstable ground. }

CHAPTER

11**HS Evidence About Earth's
Past Assessments****Chapter Outline**

- 11.1** **FOSSILS**
 - 11.2** **RELATIVE AGES OF ROCKS**
 - 11.3** **ABSOLUTE AGES OF ROCKS**
 - 11.4** **EVIDENCE ABOUT EARTH'S PAST**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

11.1 Fossils

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

- Examples of imprint fossils made by compression are
 - drawings on rock made by prehistoric humans
 - frozen remains of elephant-like mammoths
 - footprints and animal tracks
 - fossil leaves
- Fossilized insects have been found preserved in amber which is hardened
 - flower nectar
 - tree sap
 - wood
 - None of the above
- Fossilized stomach contents may indicate
 - the diet of the animal
 - the vegetation type in its habitat
 - whether an animal walked, swam or flew
 - a b
- In petrified wood, the original wood has been slowly replaced by
 - another type of harder wood
 - preserving salts
 - minerals
 - None of the above
- Scientists who study fossils are
 - fossilologists
 - palaeontologists
 - reptilologists
 - geologists
- The body of an animal is more likely to become fossilized if it:
 - is buried deeply in the ground
 - is left on the surface of the ground
 - does not contain bones or other hard body parts
 - all of the above are about equally likely to result in fossilization
- The scientific name for fossilized feces is
 - coprolites

- b. poeoliths
 - c. carbon tubules
 - d. that's too gross; no scientific name exists
8. The unaltered remains of fossilized animals include
- a. petrified wood
 - b. carbon imprints of ferns
 - c. mummified and frozen mammoths
 - d. None of the above
9. Which of the following could be a fossil?
- a. a woman who lived 15,000 years ago found frozen in a glacier
 - b. a penguin that lived 100,000 years ago found mummified in a dry valley in Antarctica
 - c. a wasp inside a 30 million year old block of amber
 - d. all of the above
10. Most of the mammal fossil record consists of
- a. bones
 - b. shells
 - c. footprints
 - d. teeth
11. If a wood fragment that is buried in sediment has minerals deposited in its empty spaces, the process of fossilization is called
- a. permineralization
 - b. molds and casts
 - c. replacement
 - d. exceptional preservation
12. The presence of marine fossils on the top of Mt. Everest indicates
- a. sea level was once higher than the top of Mt. Everest.
 - b. the fossils are not actually marine fossils, but just look like them.
 - c. the rock at the top of Mt. Everest was once under water.
 - d. someone put them up there as a trick.

True or False

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

- _____ 13. In ancient times, fossils inspired legends of monsters.
- _____ 14. Chang Qu, 2,000 years ago reported the discovery of "dragon bones," which were probably hominid fossils
- _____ 15. Ancient Greeks named ammonites after the ram god Ammon since they look like the coiled horns of a ram
- _____ 16. Fossils in older rocks are more similar to animals that live today than fossils in younger rocks.
- _____ 17. For a fossil to indicate the climate at the time the organisms lived, you have to assume that the organism lived in the same climate as similar organisms do today.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Fossils that are left by an organism but were not part of the organism are _____ fossils.
19. If a shell dissolves, the empty space in the rock is a(n) _____; if that space is filled with rock, it can form a _____.

20. Ancient insects can be preserved in _____.
21. Shells found in ancient sandstone are _____ fossils.
22. If a calcium carbonate shell is taken over by quartz, a fossil forms by _____.
23. Fossils are good at telling the story of the history of _____ on Earth.
24. The environment of _____ refers to the conditions that existed when sediments and organisms were deposited in a place.
25. A fossil that can pinpoint a specific period of time is a(n) _____.

Short Answer

Answer each question in the space provided.

26. Why are there more fossils of ammonites than there are of jellyfish?

27. List and briefly describe the types of fossilization.

Answer Key

1. d 2. b 3. d 4. c 5. b 6. a 7. a 8. c 9. d 10. d 11. a 12.a
13. true 14. false 15. true 16. false 17. true
18. trace 19. cast; mold 20. amber 21. body 22. replacement 23. life 24. deposition 25. index fossil
26. Jellyfish are soft bodied. Like other soft-bodied organisms, they fall apart or are ripped apart before they can be fossilized. Ammonites have hard shells, which
27. Types of fossilization:
- Preserved remains – Soft tissue can be preserved in special media like amber or ice.

- Permineralization – A buried piece of bone, wood or shell is infused with minerals into its empty spaces from mineral-rich water.
- Molds and casts – A bone or shell is held in sediment and leaves a depression called a mold. The mold is later filled with other sediments to create a cast.
- Replacement – The original bone or shell dissolves, but is replaced by a different mineral.
- Compression – Carbon is squeezed from a leaf or some other organism and leaves a dark imprint. }

11.2 Relative Ages of Rocks

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A rock's age compared to the ages of other rocks is called its
 - a. absolute age
 - b. confirmed age
 - c. nominal age
 - d. none of the above
2. The Law of Superposition states that in a section of rock layers
 - a. the younger rocks are found at the bottom and the older rocks are found at the top
 - b. the older rocks are found at the bottom and the younger rocks at the top
 - c. a rock that cuts across other rocks must be younger than the rock it cuts across
 - d. none of the above
3. The rock layers at the Grand Canyon
 - a. are the same on opposite sides of the river.
 - b. were formed in different ways on each side of the river.
 - c. are younger than the Colorado River in that region.
 - d. none of these.
4. A good key bed must be
 - a. found over a large area.
 - b. similar to the rock units it is found with.
 - c. a volcanic ash.
 - d. all of these.
5. The principle of faunal succession recognizes that
 - a. any type of fossil can be found with any other type of fossils.
 - b. humans and dinosaurs lived at the same time.
 - c. fossil organisms become more modern over time.
 - d. none of these.
6. If rock D cuts across rocks layers A and B, but not layer C (which is on top of B) then we know that the relative ages oldest to youngest are
 - a. A - B - C - D
 - b. A - B - D - C
 - c. D - C - B - A
 - d. C - D - A - B
7. Fossil B is younger than Fossil A, but the rock layer containing Fossil B is beneath the rock layer containing Fossil A. What happened?

- a. Steno's laws are wrong
 - b. the ages of the fossils must be wrong
 - c. the rock layers are overturned
 - d. none of these
8. A good index fossil
- a. is found in a local area
 - b. is distinctive
 - c. existed for a long period of time
 - d. all of these
9. The clay layer found at the Cretaceous-Tertiary boundary
- a. is weathered volcanic ash from an enormous eruption.
 - b. contains a high concentration of the element uranium.
 - c. could have come from the impact of an enormous asteroid.
 - d. all of these.
10. To help decipher the geologic history of a region
- a. look for rock units that are part of the same biozone.
 - b. find a key bed throughout the area.
 - c. create a geologic time scale using the rock units you see.
 - d. all of these.
11. In the geologic time scale,
- a. the oldest ages are on the top and the youngest ages are on the bottom.
 - b. the oldest ages are the most finely divided.
 - c. each of the divisions is the same number of millennia.
 - d. the names of time units come from local places where the representative rock layers are found.
12. To understand Earth history you need to know that
- a. the present is the key to the past.
 - b. the geologic time scale covers all time periods evenly.
 - c. natural laws are not always set.
 - d. time flies like arrows.

True or False

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

- _____ 13. In the 1600s, most people believed fossils formed within the rocks as a result of mysterious forces.
- _____ 14. Steno believed that marine fossils found in mountains could be explained because of the biblical flood.
- _____ 15. James Hutton thought Earth was old because he saw how slowly geological processes like sedimentation work now.
- _____ 16. Cross-cutting relationships helps geologists to determine the older and younger of two rock units.
- _____ 17. In the process of relative dating, scientists determine the exact age of a fossil or rock.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A fossil that must be studied with the aid of a microscope is called a(n) _____.
19. A(n) _____ is a rock unit that is defined by a characteristic index fossil or group of fossils.
20. In the Grand Canyon rock layers stretch over wide areas, which illustrates the principle of _____.

21. That geological processes are the same back in Earth history is the principle of _____
22. Large time periods of erosion can cause a(n) _____ in the rock record.
23. The Cretaceous Period ended at the same time as the _____ Era.
24. A distinctive layer of rock that can be recognized across a large area is a(n) _____.
25. Earth history is divided into two eons called the _____ and the _____.

Short Answer

Answer each question in the space provided.

26. What are the three possible explanations to explain how marine fossils are found in rock layers at the tops of tall mountains and why is each likely or unlikely?

27. Why is the phrase "the present is the key to the past" so important for studying Earth history?

Answer Key

1. d 2. b 3. a 4. a 5. c 6. b 7. c 8. b 9. c 10. d 11. d 12. a
13. true 14. false 15. true 16. true 17. false
18. microfossil 19. biozone 20. original horizontality 21. uniformitarianism 22. unconformity 23. Mesozoic 24. key bed 25. Phanerozoic; Precambrian
26. (1) The shells were washed up during the Biblical flood - not likely because the fossils are also found in the rock, not just on the mountain. (2) The fossils formed in the rocks in place - they are so much like marine shells that this seems unlikely. (3) The fossils are marine organisms that lived in the sea and got fossilized in rock that was uplifted to the tops of the mountains.
27. If we assume that natural laws have been the same throughout Earth history, and that the processes at work today are the same as those that were at work in Earth's past, then we can apply what we've learned about geology now

to the past. For example, if we see a lava forming a basalt rock today, we can assume that an ancient basalt rock formed from a cooling lava.}

11.3 Absolute Ages of Rocks

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Trees rings have distinctive patterns because
 - a. each tree reflects its own response to weather conditions.
 - b. a light band represents a warm year and a dark band represents a cool year.
 - c. the width of a band reflects the weather conditions during that season.
 - d. all of these.
2. A core through a glacier contains
 - a. annual layers of ice and dust.
 - b. changes in atmospheric gases over that time.
 - c. changes in the environment over that time.
 - d. all of these.
3. Varves
 - a. have layers of thin sediment from summer, thick clay from winter.
 - b. indicate the temperature conditions from a summer.
 - c. indicate how far the nearby glacier had advanced.
 - d. all of these.
4. Regarding Earth's age, geologists from the 18th and 19th centuries thought
 - a. the planet was around 6,000 years old.
 - b. natural processes occur slowly so Earth must be old.
 - c. Lord Kelvin was right that it was around 240 million years.
 - d. that the number was unknowable.
5. How much percent of the parent isotope remains after 2 half lives?
 - a. 100%
 - b. 50%
 - c. 25%
 - d. 75%
6. The half-life of a radioactive element is
 - a. half the estimated age of Earth's crust
 - b. the time it takes for half of the mass of the parent isotope to decay into the daughter isotope
 - c. half the weight of the original radioactive element
 - d. the time it takes for half of the number of parent isotopes to decay into daughter isotopes
7. The half-life of carbon-14 is about
 - a. 80000 years

- b. 23500 years
 - c. 5730 years
 - d. none of the above
8. Radioactive isotopes
- a. gain or lose particles to become different elements.
 - b. lose electrons, but the nucleus stays intact.
 - c. break apart into different elements.
 - d. none of the above
9. Potassium-argon is good for dating igneous rocks because
- a. potassium is common in many minerals.
 - b. the argon content is zero when the magma first cools.
 - c. the half-life is long.
 - d. all of these.
10. For radiometric dating of Earth's oldest rock, the best isotope system to use is
- a. uranium-238 to lead-206
 - b. potassium-argon
 - c. radiocarbon
 - d. uranium-235 to lead-207
11. The materials that are good for radiometric dating are
- a. index fossils
 - b. sedimentary rocks
 - c. igneous rocks
 - d. any rocks and index fossils
12. Scientific evidence pinpoints the age of Earth at
- a. 4.6 billion years
 - b. 4.6 million years
 - c. 6,000 billion years
 - d. 6,000 years

True or False

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

- _____ 13. Using radioactivity scientists are able to measure the relative age of some rocks.
- _____ 14. Tree ring dating can be used for events going back about 200 years.
- _____ 15. The same distinctive pattern of tree rings can be found in all the trees in an area for the same time period.
- _____ 16. Lord Kelvin underestimated Earth's age because he did not know about radioactivity.
- _____ 17. Scientists drill deep into ice sheets, producing varves hundreds of meters long.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Rock A is older than Rock B is a(n) _____ age. Rock A is 1.2 million years old is a(n) _____-age.
19. The outermost ring in a core through a tree indicates when _____.
20. Details of the ancient atmosphere can be found in air bubbles from a(n) _____.

21. _____ is the emission of high-energy particles by unstable isotopes.
22. A(n) _____ is formed from the radioactive decay of a parent isotope.
23. Radioactive dating is used to determine the _____ of objects.
24. If a zircon crystal has 100 spots for ions of lead and/or uranium, at the time the crystal forms it has _____ - _____ ions of lead and _____ ions of uranium.
25. For radiometric dating to be done the rock must contain measurable amounts of the _____ and the _____.

Short Answer

Answer each question in the space provided.

26. Explain the reason that potassium-argon is a good technique for finding the radiometric age of an igneous rock.

27. You do radiometric dating on a zircon crystal found in a sandstone and find it to be about 2 billion years old. Explain what you found the age of and what you didn't find the age of.

Answer Key

1. c 2. d 3. b 4. b 5. c 6. d 7. c 8. a 9. d 10. a 11. c 12. a
13. false 14. false 15. true 16. true 17. false
18. relative; absolute 19. when the tree died 20. ice core 21. radioactivity 22. daughter isotope 23. absolute age 24. 0; 100 25. parent isotope; daughter isotope
26. Potassium is widespread in many minerals. Argon is a gas so it is driven out of a molten magma. When the magma cools there is potassium but no argon in the crystals. So all of the argon comes from the radiometric decay of potassium, making it easy to find the ratio of the two.
27. Zircon forms in igneous rocks and the time when the radioisotope pair is set is at the time the zircon crystal formed from a cooling magma. That crystal eroded out of the igneous rock, became a sediment and was lithified to

be part of a sedimentary rock, but none of those things changed the age of the zircon crystal. So you found the age of the igneous rock that the zircon formed in but not of the sedimentary rock it later became part of.}

11.4 Evidence about Earth's Past

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which of the following are body fossils?
 - a. footprints
 - b. coprolites
 - c. burrows
 - d. bones
2. Which of the following can be used to identify a specific period of time?
 - a. body fossil
 - b. trace fossil
 - c. index fossil
 - d. amber
3. A fault or intrusion that is younger than the rocks that it cuts through is called a(n)
 - a. crosscut.
 - b. uplift.
 - c. inversion.
 - d. none of the above
4. The giant asteroid impact that extinguished the dinosaurs was first discovered
 - a. from widespread key bed that contained the element iridium.
 - b. when scientists located the giant crater.
 - c. when large chunks of the asteroid were discovered in Mexico.
 - d. none of these.
5. What is uniformitarianism?
 - a. Earth is no longer changing
 - b. the processes that act on Earth today, acted on Earth in the past
 - c. Earth is constantly changing but the causes of the change today are different than in the past.
 - d. the process that formed Earth as it is now are no longer in effect today
6. Two rock layers that are far apart but have the same index fossil
 - a. are about the same age.
 - b. formed in the same environment.
 - c. are unrelated.
 - d. none of these.
7. To learn about the changes in climate near a glacier, scientists study
 - a. crevasses

- b. ice cores
- c. varves
- d. argon gas

8. Which era do we live in?

- a. Holocene
- b. Cenozoic
- c. Quaternary
- d. Phanerozoic

9. After seven half lives

- a. an isotope pair is no longer useful.
- b. there is very little parent isotope left.
- c. there is very little measurable daughter isotope.
- d. at least 13 more half lives can pass before the pair can't be used.

10. How can you determine how long a giant Sequoia has been alive?

- a. measure the trunk
- b. count the total number tree rings
- c. radiocarbon dating
- d. determine the age of the outermost tree ring

True or False

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

- _____ 11. Fossilization is very common.
- _____ 12. A cast is made when the original bone or shell dissolves and leaves behind the an empty space in the shape of the material.
- _____ 13. The rule of continuity states that identical rock layers were once connected.
- _____ 14. The outermost tree ring indicates when the tree started growing.
- _____ 15. An unconformity can be thought of as a loss of time.
- _____ 16. Radioactivity was discovered in 1896.
- _____ 17. If a zircon crystal is 4.4 billion years old that means that the rock it is in is 4.4 billion years old.
- _____ 18. Radioactive isotopes are ideal for dating rocks because they are stable and unchanging.
- _____ 19. Different isotopes are used to date materials of different ages.
- _____ 20. Potassium-40 decays to argon-40.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. A _____ is any remains or traces of an ancient organism.
22. _____ is ancient tree sap.
23. The law of _____ states that the younger layers are at the top and the oldest are at the bottom.
24. The layers of sediment in a lake can be cored to make a(n) _____.
25. An intrusion is _____ in age than the rocks it cuts across.
26. The Quaternary Period is divided into the _____ and _____ epochs.
27. Radiocarbon dating is used to find the age of once living materials between _____ and _____ years old.

28. A rock is analyzed and found to have 25 atoms of the parent isotope and 175 atoms of the daughter. _____ half-lives have passed.
29. With beta decay, the nucleus loses _____.
30. _____ allows scientists to assign numbers to the breaks in the geologic time scale.

Short Answer

Answer each question in the space provided.

31. What are the limits on radiometric dating?

32. What are microfossils? Why are they useful?

33. An ancient artifact conveniently includes a piece of wood that is a complete slice through a tree. How could you use the rings to find the age of the tree? What does that tell you about the age of the artifact?

Answer Key

1. d 2. c 3. a 4. a 5. c 6. a 7. b 8. d 9. b 10. b

11. false 12. false 13. true 14. false 15. true 16. true 17. false 18. false 19. true 20. true

21. fossil 22. amber 23. superposition 24. varve 25. younger 26. Holocene; Pleistocene 27. 100; 50,000 28. four 29. one electron 30. absolute dating

31. The material being dated must have measurable amounts of the parent and daughter isotopes. It is best done on igneous rocks.

32. Microfossils are fossils of microscopic organisms. These fossils drifted in the upper layers of the ocean because they were distributed over very large areas.

33. The pattern of tree rings in the artifact can be matched with the known tree ring patterns for that region. The outermost ring is the date the tree died. If the tree was recently dead when it was cut for the artifact, then the age of the tree's death is the age of the artifact. However, if the wood was picked up after the tree died, we only know that the artifact is younger than the age the tree died. }

CHAPTER 12

HS Earth's History Assessments

Chapter Outline

- 12.1** **EARLY EARTH**
 - 12.2** **THE PRECAMBRIAN**
 - 12.3** **PHANEROZOIC EARTH HISTORY**
 - 12.4** **HISTORY OF EARTH'S COMPLEX LIFE FORMS**
 - 12.5** **EARTH'S HISTORY**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

12.1 Early Earth

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Scientists know that Earth and Moon formed in the same part of the solar system because they have
 - a. nearly the same ratio of rock to metal.
 - b. experienced about the same number of asteroid impacts.
 - c. the same oxygen isotope ratio.
 - d. the same ratio of oxygen to other atmospheric gases.
2. Earth's first crust was probably made of
 - a. anorthosite
 - b. granite
 - c. basalt
 - d. ultramafic peridotite
3. The densest part of planet Earth is the
 - a. core.
 - b. mantle.
 - c. continental crust.
 - d. oceanic crust.
4. The Sun formed
 - a. several hundred million years before the planets.
 - b. about 100,000 years before the planets.
 - c. at around the same time as the planets.
 - d. not long after the planets.
5. Early Earth was intensely hot because of
 - a. short-lived radioactive decay.
 - b. intense bombardment from asteroid impacts.
 - c. contraction of materials due to gravity.
 - d. all of these.
6. Earth separated into layers based on
 - a. gravity
 - b. metallicity
 - c. the tendency for material to recycle
 - d. density
7. For a planet its size, Earth
 - a. has a faster spin.

- b. is rounder.
 - c. has a smaller core.
 - d. has a high oxygen isotope ratio.
8. The earliest atmosphere
- a. was added to by gases in the solar wind.
 - b. vaporized from the heat of asteroid impacts.
 - c. evolved to become the second atmosphere.
 - d. all of these.
9. Gases in the first atmosphere came from
- a. asteroid impacts.
 - b. comet impacts.
 - c. volcanic outgassing.
 - d. all of these.
10. Scientists know that Earth had an ocean by 4 billion years ago because
- a. fossil fish are found in rocks of that age.
 - b. marine sedimentary rocks of that age can be dated.
 - c. high tide lines are found around the basin of the ancient ocean.
 - d. there was water and basins so there must have been oceans.

True or False

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

- _____ 11. Planets were created from gravity smashing together large masses of metals and rocks.
- _____ 12. Water vapor, carbon dioxide, small amounts of nitrogen, and other gases were supplied by volcanic outgassing.
- _____ 13. Due to Earth's large size, it did not experience intense bombardment from asteroid impacts.
- _____ 14. Earth accreted from the cloud of dust and gas known as the solar nebula nearly 1.6 billion years ago.
- _____ 15. The sun is approximately 100,000 years older than Earth.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. Earth's first and second atmospheres were missing the important gas _____
17. Streams carried _____ into the early oceans to make them salty.
18. _____ occurred as Earth formed, causing distinct layers.
19. The small bodies that came together to form the planets were the _____
20. The Moon is almost the same size as the smallest planet, _____.
21. Intense heat from the early core was the reason for rapid and vigorous _____ in the mantle.
22. The age of the Moon is nearly the same as the age of the rest of the _____
23. Earth's first atmosphere was made of the gases _____ and _____.

Short Answer

Answer each question in the space provided.

24. How did the Moon form?

25. Briefly describe three ways that scientists learn about the earliest Earth.

Answer Key

1. b 2. c 3. a 4. c 5. d 6. d 7. a 8. b 9. d 10. b

11. true 12. true 13. false 14. false 15. false

16. oxygen 17. dissolved minerals 18. differentiation 19. planetoids 20. Mercury 21. mantle convection 22. solar system 23. hydrogen; helium

24. About 4.5 billion years ago, a Mars-sized asteroid struck the new Earth. The energy from the impact melted both bodies. Some molten material flung up into an orbit around Earth. The material came together to form the Moon.

25. Zircon crystals are the oldest material; they show that there was crust at least 4.4 billion years ago. Meteorites are pieces of the early solar system that we can study. Lunar rocks come from the early Earth-Moon system and are as old as 4.5 billion years. }

12.2 The Precambrian

Lesson Quiz

Name_____ Class_____ Date_____

Multiple Choice

Circle the letter of the correct choice.

- Precambrian greenstone indicates the presence of
 - volcanoes
 - subduction zones
 - cratons
 - rift valleys
- How old are many of the Precambrian shields?
 - 5.7 billion years old
 - 570 million years old
 - 57 million years old
 - 5.7 million years old
- The building blocks of life are
 - amino acids
 - proteins
 - covalent bonds
 - none of the above
- During the Precambrian
 - all continents were small microcontinents.
 - there was a supercontinent called Rodinia the whole time.
 - large lava flows indicate that the supercontinent Rodinia broke up.
 - there was a solid crust that had solidified like the Moon's crust.
- Scientists know that the chemical reactions that make up the metabolism of modern organisms evolved very early in Earth history because
 - fossils show the same metabolic pathways as modern organisms.
 - there is no other type of metabolic pathway that life could possibly have.
 - very simple bacteria and the most complex organisms today have the same metabolic pathways.
 - none of these.
- Which of the following sentences is true?
 - Nucleic acids carry genetic information from one generation to the next.
 - Genetic information was probably first carried by RNA.
 - The replicator for modern organisms is DNA.
 - All of these.
- Cells may first have come together because

- a. clays provided the structure for organic molecules.
 - b. prokaryotic structures had a symbiotic relationship.
 - c. the molecules began to photosynthesize.
 - d. all of these.
8. LUCA was
- a. a eukaryotic cell.
 - b. the first organisms to use RNA as a replicator.
 - c. the last organism that was ancestor to all life on Earth.
 - d. all of these.
9. Photosynthesis uses carbon dioxide and nutrients in the presence of sunlight to create
- a. food energy and ozone.
 - b. chloroplasts and ozone.
 - c. food energy and oxygen.
 - d. life.
10. Banded-iron formations are important because they
- a. represent the time that large amounts of oxygen entered the atmosphere.
 - b. were deposited mostly during the Cambrian Explosion of life.
 - c. represent the first crust that solidified on Earth.
 - d. are the result of the evolution of cellular respiration.
11. Cratons contain
- a. mafic igneous rocks, which are remnants of the first continents.
 - b. sedimentary rocks, indicating that older rocks had existed before.
 - c. bluestone, indicating ancient subduction zones.
 - d. all of these.
12. Which of the following is true?
- a. Prokaryotes and eukaryotes are both only single celled.
 - b. Prokaryotes are only single-celled; eukaryotes are only multicellular.
 - c. Prokaryotes are single-celled or multicellular; eukaryotes are only multicellular.
 - d. Prokaryotes and eukaryotes are both single-celled or multicellular.

True or False

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

- _____ 13. The current ocean crust is much like the Earth's first crust.
- _____ 14. One hypothesis is that Earth was covered with ice about 700 million years ago.
- _____ 15. Places the craton crops out at the surface are known as a shield.
- _____ 16. Prokaryotic cells can replicate themselves better and so they are more common than eukaryotic cells.
- _____ 17. Peptobismo chains are polymers that link together amino acids to form proteins.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Blue-green algae are modern _____.
19. The abundance of _____ in the Precambrian era caused oxygen levels to rise in the atmosphere.
20. _____ form the core of the ancient continent.
21. A _____ relationship is one in which biological units (cells, organisms) help each other but do not harm each other.

22. _____ is the chemical work of cells.
23. _____ are molecules that pass genetic information to the next generation.
24. _____ is the process that producers use to convert carbon dioxide into simple sugars.
25. A eukaryote is different from a prokaryote because it has a _____.

Short Answer

Answer each question in the space provided.

26. Briefly describe the three features a molecule needs to be considered alive.

27. Why did the development of photosynthesis make Earth more hospitable for life to evolve?

Answer Key

1. b 2. b 3. a 4. c 5. c 6. d 7. a 8. c 9. c 10. a 11. b 12. d
13. true 14. true 15. true 16. false 17. false
18. cyanobacteria 19. cyanobacteria 20. cratons 21. symbiotic 22. metabolism 23. nucleic acids 24. photosynthesis
25. cell nucleus
26. The molecule must be organic; it must contain amino acids, which are the building blocks of proteins. The molecule must have a metabolism. It must be able to convert energy into work or structures in the cell. The molecule must be capable of replication; it must be able to pass its genetic information onto the next generation.
27. Photosynthesis allowed organisms to create a reliable source of food. Photosynthesizing organisms could become food for other organisms. Oxygen is a by-product of photosynthesis. Oxygen could become ozone, which protected the planet from ultraviolet radiation.}

12.3 Phanerozoic Earth History

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A mountain building event is called:
 - a. orographic
 - b. mountainog
 - c. orogeny
 - d. a fissure event
2. Pangaea began to break up how long ago?
 - a. 580 million years ago
 - b. 300 million years ago
 - c. 180 million years ago
 - d. 40 thousand years ago
3. In the Grand Canyon
 - a. all of the Paleozoic is displayed.
 - b. one transgression and one regression are exposed.
 - c. evidence of glaciation is clearly exposed.
 - d. unconformities break up the geological record.
4. The Great Unconformity in the Grand Canyon separates
 - a. transgressions from regressions.
 - b. Precambrian rocks from Paleozoic rocks.
 - c. glacial advances from glacial retractions.
 - d. Paleozoic rocks from Mesozoic rocks.
5. A supercontinent breaks up because
 - a. by the laws of physics, once the plates smash together, an equal and opposite motion must take over.
 - b. sea level rises and weighs down on the landmass.
 - c. the buildup of heat beneath the continent causes continental rifting.
 - d. none of these
6. The reasons for a a marine regression could include
 - a. an increase in the land area covered by glaciers
 - b. an increase in seafloor spreading
 - c. a lowering of a landmass
 - d. all of these
7. Evidence for the Taconic Orogeny includes
 - a. an ancient volcanic arc

- b. the Taconic Mountains of New York
- c. metamorphosed ocean sediments
- d. all of these

8. The Paleozoic

- a. begins with the supercontinent Rodinia and ends with the supercontinent Pangaea.
- b. begins with a set of microcontinents and ends with the supercontinent Pangaea.
- c. begins with a set of scattered continents and ends with the supercontinent Pangaea.
- d. begins with the supercontinent Rodinia and ends with a set of microcontinents.

9. The Sierra Nevada Mountains are the result of

- a. continental rifting in the basin and range.
- b. subduction of the Farallon plate, intrusions and uplift.
- c. mountain building when Pangaea came together.
- d. intrusions formed by an ancient, now dead, hotspot.

10. The Pleistocene ice ages lasted about

- a. 2.6 million years
- b. 260,000 years
- c. 26,000 years
- d. 2,600 years

True or False

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

- _____ 11. During a marine transgression, such as in the Cretaceous, North America was three land masses separated by seas.
- _____ 12. The glaciers on Earth today are remnants of the Pleistocene ice ages.
- _____ 13. Orogenies take place rapidly, possibly in tens of thousands of years.
- _____ 14. The Paleozoic is the furthest back era of the Phanerozoic and it lasted the longest.
- _____ 15. Since the breakup of Pangaea, all the continents have been moving apart.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. As Pangaea split apart, the _____ Ocean formed.
17. The _____ Era began 65.5 million years ago.
18. The global ocean opposite Pangaea is called _____.
19. Sedimentary _____ are distinctive rock layers that form under known conditions.
20. Since the beginning of the Paleozoic, North America experienced _____ marine transgressions.
21. Erosion can indicate a(n) _____ in which there is no evidence of what was happening geologically.
22. The sequence limestone, shale, sandstone from bottom to top indicates a marine _____.
23. Paleozoic marine _____ and marine _____ were probably due to changes in the amount of glaciation.

Short Answer

Answer each question in the space provided.

24. What is the rock sequence that indicates a marine transgression and why?

25. Why does the geologic history of the Cenozoic seem so much more like now than the geologic history of other eras?

Answer Key

1. c 2. c 3. d 4. b 5. c 6. a 7. d 8. a 9. b 10. a

11. true 12. true 13. false 14. true 15. false

16. Atlantic 17. Cenozoic 18. Panthalassa 19. facies 20. six 21. unconformity 22. regression 23. transgressions, regressions or regressions, transgressions

24. If you are standing on a beach, there will be sand, which indicates a fairly high energy environment. During a transgression the shoreline moves inland and so does the beach. You are now standing in shallow water, which is lower energy and so silt will be deposited, which will harden into shale. As the shoreline moves further inland you are now in deeper water and the lowest energy carbonate mud, which will harden into limestone, will be deposited. The sequence for a transgression is sandstone, shale and limestone from bottom to top.

25. We are still in the Cenozoic, but the geology that we see today is the result of the breakup of Pangaea. Since Pangaea broke up, the continents have been moving in the same directions and so the same geologic processes have been acting on them. This is not entirely true; for example, India is smashing into Eurasia and not moving apart. }

12.4 History of Earth's Complex Life Forms

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. _____ is the disappearance of a species from all parts of geographical range.
 - a. Fossilization
 - b. Extinction
 - c. Radioactive dating
 - d. Coevolution
2. After an extinction
 - a. a habitat is available for another species to evolve into.
 - b. no species can fill that habitat.
 - c. several species will often take the place of a single species.
 - d. none of these.
3. _____ is the process by which a single species evolves into several different species in a short period of time.
 - a. coevolution
 - b. adaptive radiation
 - c. punctuated equilibrium
 - d. macroevolution
4. An event in which many types of living things die out completely at the same time is known as _____.
 - a. punctuated equilibrium
 - b. macroevolution
 - c. convergent evolution
 - d. mass extinction
5. A species changes over time if
 - a. its environment changes.
 - b. it contains genetic variations within the population.
 - c. changes in the genetic makeup of the species accumulate.
 - d. all of these.
6. The Cambrian is best known for
 - a. the worst mass extinction in the Phanerozoic.
 - b. the tremendous swamps that led to the fossil fuel deposits we use today.
 - c. an incredible increase in the number of species.
 - d. the origin of life.
7. During the Paleozoic, biodiversity increased

- a. during marine transgressions.
 - b. during marine regressions.
 - c. during mass extinctions.
 - d. none of these.
8. An increase in biodiversity took place early in the Mesozoic because
- a. there was a mass extinction just before it began.
 - b. the breakup of Pangaea created many shore areas that were good for different life forms.
 - c. climate was warm and tropical.
 - d. all of these.
9. At the end of the Paleozoic,
- a. more than 95% of all species went extinct.
 - b. a mass extinction occurred that was caused by an asteroid impact.
 - c. dinosaurs and other land animals went extinct.
 - d. none of these.
10. Dinosaurs
- a. are completely extinct.
 - b. are nearly extinct, but one line evolved into birds.
 - c. evolved into birds and mammals.
 - d. are probably living in some faraway place.
11. Compared with Mesozoic reptiles, Cenozoic mammals are
- a. less common and less diverse.
 - b. smaller and less predatory.
 - c. more varied because they can adapt to more environments.
 - d. all of these.
12. Becoming bipedal was important to human ancestors because it
- a. allowed them to see farther and use hands for hunting.
 - b. allowed them to have hands available for farming.
 - c. made them more attractive to the opposite sex.
 - d. all of these.

True or False

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

- _____ 13. During the Mesozoic, phytoplankton became the base of the marine food web.
- _____ 14. Adaptations are characteristics of an organism that help it to survive in a given environment.
- _____ 15. Mass extinctions are always the result of a tremendous environmental catastrophe, such as an asteroid impact or intense period of volcanism.
- _____ 16. A mutation does not provide an organism the ability to adapt.
- _____ 17. The Mesozoic period is known as the age of the reptiles.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. _____ are the special characteristics that help an organism to survive in its environment.
19. The change in the genetic makeup of species over time is known as _____.
20. _____ often occurs after a mass extinction.

21. A(n) _____ is a change an organism's genes that can be passed through generations.
22. During the _____ Era, mammals evolved adaptations that allowed the to live in various environments-on land, in water, and even in the air.
23. Unlike amphibians, reptiles can live away from water because they lay _____ eggs, which contain nutrients and water and are protected from the environment.
24. Early in the _____ Era , the fossil record became rich with evidence of many types of marine life.
25. The most common and diverse organism during the Cenozoic has been _____

Short Answer

Answer each question in the space provided.

26. How could an asteroid impact have caused the mass extinction at the end of the Cretaceous?
27. Major events in human evolution occurred at 32,000 years ago, 200,000 years ago, 2 million years ago and 6 million years ago. Briefly describe each. What human ancestor lived about 3 million years ago?

Answer Key

1. b 2. a 3. b 4. d 5. d 6. c 7. a 8. d 9. d 10. b 11. c 12. a
13. true 14. true 15. false 16. false 17. true
18. adaptations 19. evolution 20. adaptive radiation 21. mutation 22. Cenozoic 23. amniote 24. Paleozoic 25. birds
26. The impacted shot dust into the atmosphere, which rained back to earth and heated the atmosphere so hot that it roasted animals. The dust blocked the sun and halted photosynthesis and cooled the planet. Sulfur mixed with water in the atmosphere to form acid rain, which dissolved plankton shells. Animals starved. Carbon dioxide from the impact caused global warming. The temperature changes were hard to survive.
27. Evidence of a spiritual life appears about 32,00 years ago with stone figurines that probably had religious significance. Our species, Homo sapiens, evolved in Africa at about 200,000 years ago, our genus Homo evolved

about 2 million years ago and bipedal primates appeared about 6 million years ago. The species *Australopithecus afarensis* walked the planet around 3 million years ago.}

12.5 Earth's History

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The age of Earth is approximately
 - a. 10,000 years
 - b. 1.1 billion years
 - c. 2.3 billion years
 - d. 4.6 billion years
2. Earth's first atmosphere was made up of...
 - a. nitrogen and oxygen
 - b. carbon and oxygen
 - c. hydrogen and carbon
 - d. hydrogen and helium
3. What is the source of water vapor, carbon dioxide, and small amounts of nitrogen in the early atmosphere?
 - a. meteorites
 - b. volcanic outgassing
 - c. oceans
 - d. earthquakes
4. Why is ozone important?
 - a. It is needed for photosynthesis in phytoplankton.
 - b. It is needed for cellular respiration in animals.
 - c. It stops high energy ultraviolet radiation from reaching the surface.
 - d. none of these.
5. What is it called when younger rocks cover a craton?
 - a. platform
 - b. shield
 - c. composite
 - d. fold
6. What stores genetic information and passes it onto the next generation?
 - a. amino acids
 - b. prokaryotes
 - c. nucleic acids
 - d. eukaryotes
7. What allowed more complex organisms to form?
 - a. photosynthesis

- b. carbon dioxide
 - c. ozone layer
 - d. RNA
8. Eukaryotes differ from prokaryotes because they
- a. are multicellular.
 - b. have a nucleus.
 - c. use RNA instead of DNA as their replicator.
 - d. contain organs.
9. What was created when Laurentia and Gondwana collided?
- a. Pangaea
 - b. Eurasia
 - c. Antarctica
 - d. India
10. The Pleistocene ice ages had unique organisms because
- a. extremely thick fur and feathers are needed to stand the cold.
 - b. very large animals are better adapted to the cold.
 - c. they evolved from the Mesozoic dinosaurs.
 - d. none of these.

True or False

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

- _____ 11. Asteroids and comets brought all the water to the early Earth.
- _____ 12. The early Earth was very cold.
- _____ 13. Ancient greenstones indicate the presence of an ancient subduction zone.
- _____ 14. The earliest cells were prokaryotes.
- _____ 15. Biodiversity in the Paleozoic was linked to marine transgressions and regressions.
- _____ 16. Mutations are rarely valuable; they usually lead to an organism's death.
- _____ 17. The mechanism for evolution is natural selection.
- _____ 18. The largest mass extinction occurred at the end of the Cretaceous period.
- _____ 19. The dinosaurs went extinct 65 million years ago.
- _____ 20. The Cenozoic era should be called the age of the birds.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. The separation of Earth into layers based on density is known as _____.
22. The early Earth was hit frequently with _____ and _____.
23. The earliest felsic continental crust is now found in the ancient cores of continents, called _____.
24. The Miller-Urey experiment produced _____, which are needed to make _____, by passing sparks through a mixture of hydrogen, methane, ammonia, and water.
25. Organic molecules must carry out the chemical work of cells called _____.
26. _____ allows organisms to use sunlight and inorganic material to create chemical energy that they can use for food.

27. Sea level rises over the land during a _____.
28. A mountain building event is an _____.
29. Swamps during the _____ Period became the coal and petroleum that we use today.
30. _____ are differences in a population that helps some members survive better than others.

Short Answer

Answer each question in the space provided.

31. Why was oxygen needed in the atmosphere before complex life could evolve.

32. How have asteroid impacts affected life on Earth?

33. Explain the importance of adaptation to organisms.

Answer Key

1. d 2. d 3. b 4. c 5. a 6. c 7. c 8. b 9. a 10. b

11. false 12. false 13. true 14. true 15. true 16. true 17. true 18. false 19. true 20. true

21. differentiation 22. asteroids; comets 23. cratons 24. amino acids; proteins 25. metabolism 26. photosynthesis
27. marine transgression 28. orogeny 29. Carboniferous 30. variations

31. Oxygen is essential for life on Earth for two reasons: (1) three oxygen ions come together to make ozone, which protects the surface from harmful ultraviolet radiation, and (2) animals need oxygen to breathe.

32. They have brought water and amino acids for the oceans, atmosphere, and life, and by forming the Moon. Mass extinctions have occurred throughout history may also have been caused by asteroid impacts, including the extinction of the dinosaurs.

33. Adaptations allow organisms to be successful in the environment in which they live. Organisms must be adapted by having protection from the external environment, the ability to gather nourishment without being eaten, and the ability to mate and produce offspring. }

CHAPTER

13**HS Earth's Fresh Water Assessments****Chapter Outline**

- 13.1** **WATER ON EARTH**
 - 13.2** **SURFACE WATER**
 - 13.3** **GROUNDWATER**
 - 13.4** **EARTH'S FRESH WATER**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

13.1 Water on Earth

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Water is stored in
 - a. ice and snow
 - b. the atmosphere
 - c. lakes and streams
 - d. all of these
2. Water is composed of which of the following atoms?
 - a. 1 oxygen and 2 helium
 - b. 1 oxygen and 2 hydrogen
 - c. 2 oxygen and 1 hydrogen
 - d. 2 oxygen and 2 hydrogen
3. Which is not a major part of the hydrological cycle?
 - a. evaporation
 - b. transpiration
 - c. crustation
 - d. condensation
4. The largest amount of fresh water is contained in
 - a. ice caps, glaciers and inland seas
 - b. rivers and streams
 - c. the atmosphere
 - d. groundwater and soil moisture
5. The water cycle
 - a. begins and ends in the oceans.
 - b. has no beginning and has no end.
 - c. begins in the oceans and ends in groundwater aquifers.
 - d. begins in the atmosphere and ends in the oceans.
6. The energy for the water cycle comes from
 - a. radioactive decay.
 - b. Earth's internal heat.
 - c. the Sun.
 - d. water when it changes state.
7. The ocean is salty because
 - a. only water evaporates.

- b. salts undergo condensation.
 - c. only water infiltrates the ground.
 - d. none of these.
8. Water changes from a liquid to a solid in the process of
- a. precipitation
 - b. evaporation
 - c. condensation
 - d. none of these
9. Water changes from a liquid to a gas in the process of
- a. precipitation
 - b. evaporation
 - c. condensation
 - d. none of these
10. An important reservoir for water is
- a. the oceans
 - b. soil moisture
 - c. the atmosphere
 - d. all of these
11. In the process of transpiration, water goes from the soil
- a. through the ground to an aquifer.
 - b. to the atmosphere by changing from liquid to gas.
 - c. to the atmosphere through a plant.
 - d. none of these.
12. If the climate warms and glaciers melt, sea levels will rise. This means that
- a. there is a constant amount of water on Earth.
 - b. water takes up more space than ice.
 - c. the seas will never lower again.
 - d. none of these.

True or False

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

- _____ 13. 97% of water on Earth is in the oceans.
- _____ 14. Soil moisture is important for plants to grow.
- _____ 15. Water is the only substance on Earth and on Mars that is present in all three states of matter – as a solid, liquid or gas
- _____ 16. Water turns to gas through condensation.
- _____ 17. People use water from nearby streams, but not from further away.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The movement of water between reservoirs is called the _____ .
19. The gas phase of water is called _____.
20. Less than 3% of all the water on Earth is _____.
21. Freshwater is primarily found in ice sheets, lakes, rivers and _____.

22. _____ is the process of a substance changing from a solid to gas without going through the liquid phase.
23. Snow and ice can be a(n) _____ for water that people can use in the summer when they melt.
24. Surface water infiltrates the ground and enters the _____.
25. The amount of time a water molecule stays in the ocean is its _____ for the ocean.

Short Answer

Answer each question in the space provided.

26. Draw the water cycle and label the parts.

27. List two of the remarkable properties of water.

Answer Key

1. d 2. c 3. b 4. a 5. b 6. c 7. a 8. d 9. b 10. d 11. c 12. a
13. true 14. true 15. false 16. false 17. false
18. water cycle or hydrologic cycle 19. water vapor 20. fresh water 21. groundwater 22. sublimation 23. reservoir
24. groundwater 25. residence time
26. See water cycle figure in section "The Water Cycle" in text.
27. Water expands when it freezes so the solid is less dense than the liquid. Water has high surface tension so the molecules tend to stick together. }

13.2 Surface Water

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The Great Lakes
 - a. contain 12% of the world's fresh surface water.
 - b. have tides.
 - c. are so cold, not much lives in them.
 - d. formed when tectonic faults created basins.
2. The river with the largest water flow is the
 - a. Nile
 - b. Mississippi
 - c. Colorado
 - d. Amazon
3. The study of fresh water bodies and their organisms is called
 - a. limnology
 - b. lakology
 - c. oceanology
 - d. hydrology
4. Two streams meet at a point called:
 - a. conjoinment
 - b. confluence
 - c. consignment
 - d. condense
5. Most lakes formed
 - a. in volcanic craters
 - b. by glaciers
 - c. in down-dropped fault zones
 - d. during marine transgressions
6. The portion of a lake with a lot of scavengers and no plants is the
 - a. littoral zone
 - b. open-water zone
 - c. deep-water zone
 - d. photic zone
7. The portion of a lake with plants growing from the sediment is the
 - a. littoral zone

- b. open-water zone
- c. deep-water zone
- d. photic zone

8. Lakes

- a. are all features that last thousands of years.
- b. are permanent features of a landscape.
- c. can be seasonal, or can disappear over time.
- d. none of these.

9. Plants and animals in a swamp must be adapted to

- a. a wide range of temperature conditions.
- b. high salinity in the water.
- c. a habitat that is unfavorable for life.
- d. low oxygen content in the water.

10. Estuaries have high biodiversity because they have

- a. a large diversity of salt content.
- b. warm water temperatures and high salinity.
- c. low salinity and a variety of water temperatures.
- d. a wide range of temperatures, but a small range in salinity.

11. A wetland with trees and vines is a

- a. marsh
- b. swamp
- c. estuary
- d. forest

12. A levee on a river bank

- a. keeps flood waters from going over the banks all along the river.
- b. does little to protect the land near the river bank.
- c. may increase flood waters upstream or downstream from the levee.
- d. none of these.

True or False

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

- _____ 13. Streams usually begin with water from snow melt and possibly springs.
- _____ 14. Brackish water is more saline than sea water.
- _____ 15. The Great Lakes are so large they can alter the weather.
- _____ 16. A tributary is the larger of two streams that join together.
- _____ 17. When dams stop floods, farmers need fertilizers for their crops.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The portion of a lake with abundant sunlight is the _____ zone.
19. A body of freshwater smaller than a lake is a(n) _____.
20. A(n) _____ feeds water into a larger stream.
21. A high occurrence of rain can cause a(n) _____ in a low lying area.
22. The Aswan Dam was built on the _____ River in the country of _____.

23. A(n) _____ runs down the Rocky Mountain range and separates water into the Pacific and Atlantic oceans.
24. The area where the mouth of a river enters an ocean or lake is a(n) _____.
25. Floodwaters that rise very fast create a(n) _____.

Short Answer

Answer each question in the space provided.

26. Why would logging a hill mean that floods would be more likely in a region?

27. Draw a picture of a lake and show the aphotic zone, photic zone, littoral zone, open-water zone and deep-water zone. Briefly describe the life found in the littoral, open-water and deep-water zones.

Answer Key

1. b 2. d 3. a 4. b 5. b 6. c 7. a 8. c 9. d 10. a 11. b 12. c

13. true 14. false 15. true 16. false 17. true

18. photic or open water 19. pond 20. tributary 21. flood 22. Nile; Egypt 23. continental divide 24. mouth 25. flash flood

26. Plants absorb water and give it time to infiltrate into the ground so flooding is less likely to happen. Plants slow water so it all doesn't hit the stream at once. Logging a hill takes away those slowing and absorbing features and makes flooding more likely.

27. See figure in text in Ponds and Lakes section with the caption "The three primary zones of a lake are the littoral, open-water and deep-water zones." Descriptions of life are: littoral: plants, animals that need shelter like snails, insects fish; open-water: plants and fish; and deep-water: scavengers }

13.3 Groundwater

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What happens when the water table is lowered?
 - a. deflation
 - b. inflation
 - c. contraction
 - d. subsidence
2. The Ogallala Aquifer covers
 - a. 4,400 square kilometers
 - b. 44,000 square kilometers
 - c. 4.4 million square kilometers
 - d. 440,000 square kilometers
3. The way water moves through soil particles is called
 - a. capillary action
 - b. vein action
 - c. permeable movement
 - d. porous movement
4. What are the two features of a good aquifer?
 - a. high porosity and high permeability
 - b. low porosity and high permeability
 - c. high porosity and low permeability
 - d. low porosity and low permeability
5. Below ground, the water table
 - a. is flat
 - b. roughly slopes downward to the discharge area
 - c. roughly slopes upward to the recharge area
 - d. roughly follows the slope of the land surface
6. For the water in a groundwater aquifer to stay at the same level
 - a. recharge must be greater than discharge
 - b. recharge must be equal to discharge
 - c. recharge must be less than discharge
 - d. none of these; the two are not related
7. Underground water that is not part of a large water body is a(n)
 - a. aquifer

- b. aquiclude
 - c. spring
 - d. sinkhole
8. During very wet times, the water table will
- a. stay the same
 - b. rise
 - c. fall
 - d. hard to know; water tables are not affected by surface conditions.
9. Groundwater is
- a. a renewable resource that is often used in a renewable way.
 - b. non-renewable resource that is often used in a non-renewable way.
 - c. a renewable resource that is often used in a non-renewable way.
 - d. a non-renewable resource that is often used in a renewable way.
10. Overpumping groundwater can result in
- a. an increase in spring action.
 - b. land faulting.
 - c. salt water incursion.
 - d. all of these.
11. Water spews out at the surface on its own in a(n)
- a. flowing artesian well
 - b. artesian well
 - c. sinkhole
 - d. none of these
12. Water replenishes an aquifer from
- a. glacial meltwater
 - b. rainfall
 - c. snow melt
 - d. all of these

True or False

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

- _____ 13. In arid climates, streams may be almost entirely spring fed.
- _____ 14. Aquifers are generally found at the same depths.
- _____ 15. Land use in an area can affect the amount of water that is available to enter groundwater.
- _____ 16. A good aquifer has rock in it that is porous and permeable.
- _____ 17. The bottom layer of an aquifer has impermeable rock.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Sediments or rock with a lot of holes has high _____.
19. Water moves by _____ from wet areas to drier areas.
20. Areas above oil fields and large water aquifers experience _____ with extraction.
21. A rock that water can flow through has high _____.
22. A(n) _____ is created where groundwater seeps or flows from rock or soil.

23. Florida has so much underground water because the water dissolves the _____ rock.
24. When the _____ goes down, wells need to be dug deeper.
25. To reach groundwater, people must dig or drill a(n) _____.

Short Answer

Answer each question in the space provided.

26. Describe the journey of a water molecule from a raindrop to an aquifer.

27. Describe the Ogallala Aquifer and why it is important.

Answer Key

1. d 2. d 3. a 4. a 5. d 6. b 7. b 8. b 9. c 10. c 11. a 12. d
13. true 14. false 15. true 16. true 17. true
18. porosity 19. capillary action 20. subsidence 21. permeability 22. spring 23. limestone 24. water table 25. well
26. The water falls on the ground and is attracted to soil particles by capillary action. It moves down through the soil and then enters the aquifer.
27. The Ogallala Aquifer is found beneath eight states from South Dakota down through Texas. It is a region that is heavily farmed and there are also towns and cities that need water. The aquifer is 30 to 100 meters deep and supplies about one-third of the irrigation water in the United States. The aquifer is being pumped at about eight times the rate that it is being replenished. }

13.4 Earth's Fresh Water

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What percent of the Earth's water is fresh water?
 - a. 4%
 - b. 3%
 - c. 2%
 - d. 1%
2. What is the amount of time a molecule stays in a reservoir?
 - a. wait time
 - b. reservoir time
 - c. residence time
 - d. cycle time
3. With transpiration
 - a. plants absorb water into their tissues
 - b. plants take water from the soil and let water vapor out into the air
 - c. water vapor becomes liquid water in a tiny droplet
 - d. solid water becomes water vapor without first becoming a liquid
4. What are bodies of water that have a current?
 - a. pool
 - b. pond
 - c. stream
 - d. estuary
5. The zone in a lake where there is much life and some can grow from the bottom is the
 - a. littoral zone
 - b. photic zone
 - c. aphotic zone
 - d. none of these
6. In an estuary
 - a. salt water from the sea mixes with fresh water from a stream
 - b. there are few plants and animals
 - c. there is little biodiversity
 - d. all of these
7. Which of the following is true about floods?
 - a. Levees are completely effective at saving development from flooding.

- b. They are very damaging and must be stopped.
 - c. They move large amounts of sediment that provide habitat for organisms.
 - d. None of these.
8. The amount of water that enters the groundwater in a region depends on
- a. local climate
 - b. vegetation cover
 - c. the slope of the land
 - d. all of these
9. Which aquifer supplies one-third of the irrigation in the United States?
- a. Mahomet Aquifer
 - b. Edwards Aquifer
 - c. Kirkwood-Cohansey Aquifer
 - d. Ogallala Aquifer
10. If more water is pumped from aquifer but the water table stays at the same level, you can say that
- a. the aquifer is very full of water.
 - b. the increase in recharge is equal to the increase in pumping.
 - c. the water table will soon go down.
 - d. none of these.

True or False

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

- _____ 11. Water vapor in the atmosphere undergoes precipitation to become tiny droplets of liquid.
- _____ 12. Rivers are the largest type of streams.
- _____ 13. Lakes are small bodies of water that have no outlet.
- _____ 14. The mouth of a water source is where a stream originates.
- _____ 15. Lakes do not ever disappear.
- _____ 16. Swamps are low oxygen environments that can lead to coal formation.
- _____ 17. Brackish water has more salt than fresh water but less than sea water.
- _____ 18. Withdrawing too much water from aquifers may cause subsidence.
- _____ 19. The aphotic zone for a lake has abundant sunlight.
- _____ 20. Streams can only flow downhill.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. The movement of water around Earth's surface is the _____ cycle.
22. The storage locations for water such as an ocean, glaciers, ponds, or the atmosphere are a(n) _____.
23. Water changes from a liquid to a gas by _____ to become water vapor.
24. Two streams come together at a _____.
25. The smaller of two streams is a _____ of the larger stream.
26. A stream may create a _____ where water slows and becomes deeper.
27. _____ ecosystems can be fragile systems that are sensitive to the amounts and quality of water present within them.

28. _____ are shallow wetlands around lakes, streams, or the ocean where grasses and reeds are common.
29. The _____ zone is the slope area closest to the edge of water.
30. Water at the mouth of a delta where it meets the ocean is chemically _____.

Short Answer

Answer each question in the space provided.

31. Draw the water cycle. Label the reservoirs and processes.

32. Describe the features of a groundwater aquifer.

33. How did the Great Lakes form? What are some of their unique features?

Answer Key

1. b 2. c 3. b 4. c 5. a 6. d 7. b 8. c 9. b 10. d
11. false 12. true 13. false 14.true 15.false 16. false 17. true 18. true 19. false 20. false

21. hydrologic (water) 22. reservoir 23. evaporation 24. confluence 25. tributary 26. pool 27. wetlands 28. marshes 29. littoral (surface) 30. brackish

31. Water in the ocean → evaporation into water vapor in the atmosphere → condenses into clouds and tiny droplets of water → precipitation occurs as rain, sleet, or snow and falls back to the earth → water runs into rivers or becomes groundwater which will eventually get to the oceans.

32. An aquifer is a porous and permeable layer that has an impermeable layer below it. Water travels through the aquifer very slowly. Water trickles down into the aquifer by capillary action. The top of the zone that contains water is called the water table.

33. The Great Lakes formed when glaciers carved giant basins in the rock during the Pleistocene. The lakes are so large that they contain 22% of world's freshwater. The largest of the lakes have tides and they can alter the weather system. They have an incredible amount of biodiversity. }

CHAPTER 14

HS Earth's Oceans Assessments

Chapter Outline

- 14.1 INTRODUCTION TO THE OCEANS
 - 14.2 OCEAN MOVEMENTS
 - 14.3 THE SEAFLOOR
 - 14.4 OCEAN LIFE
 - 14.5 EARTH'S OCEANS
-

- The answer keys can be found in the Resource tab above the Table of Contents.

14.1 Introduction to the Oceans

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What percent of the Earth is covered in salt water oceans?
 - a. 82%
 - b. 71%
 - c. 65%
 - d. 49%
2. Earth's tallest mountain (base to top) is in the
 - a. Pacific Ocean
 - b. Atlantic Ocean
 - c. Indian Ocean
 - d. Himalaya Mountain Range
3. Which ocean contains the deepest trench?
 - a. Atlantic Ocean
 - b. Indian Ocean
 - c. Arctic Ocean
 - d. Pacific Ocean
4. The most common minerals in seawater are
 - a. calcium chloride
 - b. calcium carbonate
 - c. sodium chloride
 - d. magnesium
5. Salt in the oceans comes from
 - a. deep-sea hydrothermal vents
 - b. near shore salt deposits
 - c. river inflow
 - d. mid-ocean ridges
6. The reason the Dead Sea is so saline is
 - a. the rivers that flow into it carry many salts.
 - b. evaporation is very high.
 - c. there is a lot of runoff from the nearby saline landscape.
 - d. none of these.
7. Water density decreases as
 - a. salinity increases, temperature decreases, pressure decreases

- b. salinity increases, temperature increases, pressure increases
 - c. salinity decreases, temperature increases, pressure decreases
 - d. salinity decreases, temperature decreases, pressure decreases
8. The deepest point in the ocean is a(n)
- a. mid-ocean ridge
 - b. atoll
 - c. submarine trench
 - d. none of these.
9. Deep open water, below 6,000 meters, is the
- a. abyssal zone
 - b. hadal pelagic zone
 - c. hadal zone
 - d. abyssal pelagic zone
10. The ocean zone that is always covered by water, but is fairly shallow in depth is the
- a. intertidal zone
 - b. oceanic zone
 - c. photic zone
 - d. neritic zone

True or False

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

- _____ 11. The yearly weather at a site on the coast is most likely more moderate than at a site inland about 100 miles.
- _____ 12. Biomass is the total mass of a particular organism in a given area.
- _____ 13. Brackish water is water that has more salt than fresh water but less than sea water.
- _____ 14. Without chlorophyll, there could be no photosynthesis.
- _____ 15. Earth really has one ocean since all the oceans are connected.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. Between high and low tide is the _____ zone.
17. Photosynthesizing organisms must live in the _____ zone.
18. _____ is the sum of the mass of the living organisms in an area.
19. Water easily dissolves salts because it is a(n) _____ molecule.
20. If you add salt to water, the density of the water _____.
21. With 33.7% the Dead Sea has the highest _____ on Earth; the oceans have an average of 3.5%.
22. Most energy and nutrients in the oceans are supplied by tiny creatures called _____.
23. Waves, tides and currents move water around in the _____ zone.

Short Answer

Answer each question in the space provided.

24. How do the oceans distribute heat around Earth?

25. Draw a diagram of the ocean and label the major horizontal and vertical divisions.

Answer Key

1. b 2. a 3. d 4. c 5. c 6. b 7. a 8. c 9. b 10. d

11. true 12. false 13. true 14. true 15. true

16. littoral 17. photic 18. biomass 19. polar 20. increases 21. salinity 22. phytoplankton 23. intertidal or littoral

24. Solar energy comes in mostly near the equator. Ocean currents that move along this region become very warm. As the currents move away from the equator they take the heat to regions that get less solar energy. These regions are cooler so the additional heat makes them warmer than they would be.

25. See the section "Vertical Divisions" and the figure "Oceanographers divide the ocean in to zones both vertically and horizontally." }

14.2 Ocean Movements

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What causes the Coriolis effect?
 - a. Moon's gravity
 - b. Sun's gravity
 - c. gyres
 - d. Earth's rotation
2. What is the primary cause of the tides?
 - a. Earth's rotation
 - b. The moon's gravity
 - c. the Sun's gravity
 - d. wind
3. Where is wave energy the greatest?
 - a. at the surface
 - b. at the ocean floor
 - c. half way between the surface and the ocean floor
 - d. None of the above
4. A wave breaks because
 - a. the base has friction with the bottom.
 - b. it becomes too tall to be supported by its base.
 - c. it reaches the shore.
 - d. all of these.
5. Wave energy is
 - a. the same from the surface to its greatest depth.
 - b. lowest at the surface and increases with depth.
 - c. greatest at the surface and decreases with depth.
 - d. none of these.
6. The highest high and lowest low tides occur
 - a. in the spring.
 - b. when Sun, Moon and Earth are aligned.
 - c. When Sun and Moon are at 90-degrees to each other relative to Earth.
 - d. during the one-quarter and three-quarter moon.
7. Low tides occur about
 - a. every 24 hours and 50 minutes

- b. every 12 hours and 25 minutes
 - c. every 6 hours and 12.5 minutes
 - d. randomly.
8. Surface currents are created by
- a. local wind patterns
 - b. the depth of the seafloor
 - c. the rotation of the Earth.
 - d. all of these.
9. Thermohaline circulation is due to
- a. salinity differences in water masses.
 - b. temperature differences in water masses.
 - c. density differences in water masses.
 - d. none of these.
10. In the polar regions,
- a. surface water becomes dense so that it undergoes upwelling.
 - b. surface water becomes cold and saline so that it undergoes downwelling.
 - c. warm currents like the Gulf Stream keep ice from forming.
 - d. none of these.
11. Upwelling along the equator
- a. brings nutrients to the surface so there is a lot of life.
 - b. brings warm water to the surface so there are coral reefs where there are islands.
 - c. brings cold, saline water from near South America to near eastern Asia.
 - d. none of these.
12. Dense water downwelling in the polar regions
- a. drives deep water circulation.
 - b. results in upwelling in some coastal and equatorial regions.
 - c. pushes some currents around the surface.
 - d. all of these.

True or False

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

- _____ 13. The greatest effect on tides is from the Sun because it has the greatest gravitational pull on Earth.
- _____ 14. The tides are actually waves, with the high tides being the crest and the low tides being the trough.
- _____ 15. A wave is a transfer of energy, that initially began with wind.
- _____ 16. The first sign that a tsunami is coming could be that water moves out to sea, leaving the shore exposed.
- _____ 17. Once the bottom of the wave loses its energy from friction with the ground, the top of the wave starts to slow down.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Surface currents deliver _____ around the planet.
19. Tides with the smallest tidal range are called _____ tides.
20. _____ are pushed along by surface winds.
21. The height difference between adjacent high and low tides is known as the _____.

22. The United Kingdom predominantly has rain instead of snow in winter due to the surface current called the _____.
23. Dense water sinks in a process called _____.
24. During a hurricane, _____ may push a large amount of water into the harbor causing boats to crash into one another.
25. The deepest water probably has the _____ salinity and the _____ temperature of water in that water column.

Short Answer

Answer each question in the space provided.

26. Hurricanes and other storms do a lot of damage due to storm surge. What is storm surge?

27. Describe the factors that come together to create a gyre.

Answer Key

1. d 2. b 3. a 4. d 5. c 6. b 7. b 8. a 9. c 10. b 11. a 12. d
13. false 14. true 15. true 16. true 17. false
18. heat 19. neap 20. surface currents 21. tidal range 22. Gulf Stream 23. downwelling 24. storm surge 25. highest; lowest
26. Storm surge is when wind and waves push water up onto a shoreline. Storm surge also occurs because the low pressure at the center of the storm sucks water up higher and raises sea level in that area.
27. Water moves in the direction of global winds: the trade winds, the westerlies and the polar easterlies. When the water runs into a continent, it turns to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. The direction is due to Coriolis effect: clockwise in the Northern Hemisphere and counter-clockwise in the Southern Hemisphere. }

14.3 The Seafloor

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What is the deepest that scuba divers are usually able to go?
 - a. 40 Ft
 - b. 10 m
 - c. 10 Ft
 - d. 40 m
2. What does ROV stand for?
 - a. Renovated Operated Vehicle
 - b. Remotely Obtuse Vehicle
 - c. Remotely Operated Vehicle
 - d. Really Outdated Vehicle
3. What fishing method involves a net that scrapes the ocean floor?
 - a. bottom trawling
 - b. line casting
 - c. bottom feeding
 - d. line trawling
4. What is a map of the seafloor called?
 - a. a topographic map
 - b. a bathymetric map
 - c. a contour map
 - d. a Mercator map
5. Which are not found in the ocean?
 - a. fish
 - b. oil gas
 - c. valuable minerals
 - d. all are found in the oceans
6. To sample seawater,
 - a. divers go down to the right depth, then open and close a bottle.
 - b. bottles along a cable close as a weight is dropped down the cable.
 - c. a submersible goes down to the right depth, then opens and closes a bottle.
 - d. none of these.
7. To get rocks from the seafloor
 - a. a dredge is dragged along the bottom.

- b. a metal tube is dropped to the bottom.
 - c. a drill drills into the crust.
 - d. all of these.
8. Oil platforms can drill in water that is up to
- a. 2000 meters deep
 - b. 1000 meters deep
 - c. 100 meters deep
 - d. 200 meters deep
9. Resources in the oceans are
- a. both living and non-living.
 - b. scarce
 - c. virtually impossible to obtain.
 - d. mostly at the surface.
10. It is difficult to learn about the oceans because they
- a. are saline and cold
 - b. are cold and dark
 - c. have intense currents that are hard to battle
 - d. none of these

True or False

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

- _____ 11. To understand ocean chemistry, scientist need samples of seawater from different depths.
- _____ 12. It is possible for a submersible to take scientists to depths of up to one mile for observations.
- _____ 13. We know more about the dark side of the Moon than we know about the seafloor.
- _____ 14. To analyze a rock for paleomagnetism, you need to know its position in the seafloor.
- _____ 15. Most oceanographic research is done by scuba divers.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. A map of seafloor features is similar to a _____ map of the land.
17. A metal tube that is dropped to the seafloor to collect sediment and rock is a(n) _____
18. Alvin is a human operated vehicle, also known as a _____
19. If a fish species is being taken at a higher rate than it reproduces, the species is being _____
20. Valuable minerals in the seafloor are contained in _____ nodules.
21. A bottle used to sample seawater at depth is called a(n) _____
22. The Joides Resolution is a ship that has the ability to _____
23. Scientists analyze rocks drilled from the seafloor for their paleomagnetism and their _____

Short Answer

Answer each question in the space provided.

24. What are the advantages of an ROV over an HOV for seafloor exploration?

25. What are the problems with bottom trawling?

Answer Key

1. d 2. c 3. a 4. b 5. d 6. b 7. d 8. a 9. a 10. b

11. true 12. false 13. true 14. true 15. false

16. topographic 17. gravity corer 18. submersible 19. overharvested or overfished 20. manganese 21. Niskin bottle
22. drill into the seafloor 23. chemistry

24. The bottom of the ocean is dangerous; losing a machine is expensive but not as bad as losing a human crew. The ROV can go into dangerous places that an HOV shouldn't go. Humans can only stay on the bottom so long, but an ROV can stay for an unlimited period of time.

25. Bottom trawling scrapes the seafloor, which disturbs ecosystems at the bottom. }

14.4 Ocean Life

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Zooplankton
 - a. engage in photosynthesis.
 - b. engage in chemosynthesis.
 - c. absorb nutrients from the water.
 - d. eat phytoplankton.
2. Light created from a chemical reaction in an organisms is called
 - a. biological lighting
 - b. bioluminescence
 - c. night lighting
 - d. ledinescence
3. What type of organism found in the ocean floats along with the current?
 - a. whales
 - b. jellyfish
 - c. plankton
 - d. squids
4. What part of a fish's body extracts oxygen from the water?
 - a. bladder
 - b. gills
 - c. spleen
 - d. lungs
5. Which of the following is NOT a marine invertebrate?
 - a. starfish
 - b. octopi
 - c. sea worms
 - d. eels
6. One reason that there are few species of marine reptiles is that
 - a. reptiles cannot swim.
 - b. reptiles do not eat fish and other marine creatures.
 - c. most reptiles must lay their eggs on land.
 - d. most marine reptiles went extinct at the end of the Cretaceous.
7. What is the purpose of a swim bladder?
 - a. to rise and sink to the desired depth

- b. for oxygen away from the surface
 - c. for collecting salt extracted from the kidneys
 - d. for energy for bioluminescence
8. The trait that marine mammals have that land mammals do not is
- a. endothermy
 - b. the ability to give birth to live young
 - c. impervious skin
 - d. hair, ears, jawbones with teeth
9. To keep anchored to rock, intertidal organisms have
- a. hard shells.
 - b. strong attachments.
 - c. tremendous wedging capabilities.
 - d. none of these.
10. Ecosystems with among the greatest biodiversity on Earth include
- a. tide pools.
 - b. the seafloor.
 - c. coral reefs.
 - d. the surface ocean.
11. Corals are
- a. animals
 - b. calcium carbonate
 - c. phytoplankton
 - d. none of these
12. Life in the deepest ocean is
- a. non-existent
 - b. abundant
 - c. about the same as at the surface
 - d. scarce

True or False

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

- _____ 13. All marine birds come to shore to sleep and raise chicks.
- _____ 14. Some zooplankton are juvenile forms of invertebrates.
- _____ 15. Plankton are organisms that can swim against the current.
- _____ 16. Organisms at hydrothermal vents can live without food energy from the surface.
- _____ 17. If an ocean plant can photosynthesize, light must be available to the plant.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. To move and steer, fish have _____.
19. _____ is the breakdown of chemicals to produce food energy.
20. _____ must float in or near the well lit areas of the sea surface to photosynthesize sunlight.
21. The creation of food energy is known as _____.
22. With long legs and long bills, shorebirds are well adapted to the _____ zone.

23. For protection from drying out and wave energy, organisms in the intertidal have _____.
24. Corals are sensitive to pollution and, especially important now, they are sensitive to _____.
25. Rounded coral reefs with no land visible at the surface are called _____.

Short Answer

Answer each question in the space provided.

26. What adaptations do marine mammals have to life in the sea and why?

27. What adaptations do fish have for life in the deepest ocean?

Answer Key

1. d 2. b 3. c 4. b 5. d 6. c 7. a 8. c 9. b 10. c 11. a 12. d
13. false 14. true 15. false 16. true 17. true
18. fins 19. chemosynthesis 20. phytoplankton 21. primary productivity 22. intertidal 23. shells 24. temperature
25. atolls
26. For swimming: streamlined bodies, slippery skin or hair, fins. For warmth: fur, fat, high metabolic rate, small surface area to volume, specialized blood system. For salinity: kidneys that excrete salt, impervious skin.
27. Fish at the bottom of the ocean get few meals so they are well adapted to attract food and use little energy. They are very small and have very little bone structure. The fish have a slow metabolism, move slowly and breathe slowly. To maximize the chance of getting a meal they attract prey with items such as bioluminescent lures. To keep prey from escaping, they have backward folding teeth. }

14.5 Earth's Oceans

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Ocean salinity is high where
 - a. evaporation is high; fresh water mixing is high
 - b. evaporation is high; fresh water mixing is low
 - c. evaporation is low; fresh water mixing is high
 - d. evaporation is low; fresh water mixing is low
2. Organisms in tide pools live
 - a. in the neritic zone.
 - b. between the high and low tide marks.
 - c. in relatively stable conditions.
 - d. none of these.
3. In the zone below where sunlight penetrates, there is
 - a. no primary productivity.
 - b. no photosynthesis.
 - c. no well-developed food web.
 - d. all of these
4. Which zone makes up the majority of the ocean?
 - a. deep sea
 - b. photic zone
 - c. aphotic zone
 - d. none of these
5. Upwelling is important because
 - a. organisms depend on the nutrient-rich water from the deep.
 - b. cold water goes down to the seafloor and warm water comes up to the surface.
 - c. it drives surface ocean currents.
 - d. it drives deep ocean currents.
6. Which tides have the smallest tidal range and occur when the Earth, the Moon, and the Sun form a 90° angle?
 - a. spring tide
 - b. neap tide
 - c. high tide
 - d. low tide
7. Which currents are potentially dangerous that carry large amounts of water offshore quickly?
 - a. rip currents

- b. longshore currents
 - c. surface currents
 - d. deep currents
8. Thermohaline circulation is driven by
- a. wind
 - b. upwelling
 - c. density
 - d. Coriolis effect
9. Compared with land mammals, marine mammals have
- a. streamlined bodies.
 - b. high metabolic rates.
 - c. kidneys that secrete salt.
 - d. all of these
10. Compared with fish near the surface, fish in the deep sea are
- a. larger.
 - b. better adapted to their environment.
 - c. better able to find food.
 - d. none of these.

True or False

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

- _____ 11. About 71% of the Earth's surface is covered in water.
- _____ 12. The average salinity of seawater is 3.5%.
- _____ 13. Tsunamis travel across the sea as giant waves, but do most of their damage when they hit shore.
- _____ 14. Spring tides occur only in the spring.
- _____ 15. Downwelling is where very cold, very saline water is very dense and sinks.
- _____ 16. Organisms at hydrothermal vents get energy from chemicals.
- _____ 17. There is one high tide and one low tide a day in most locations.
- _____ 18. Coral animals are very resilient to temperature changes.
- _____ 19. Photosynthetic life has been found near hydrothermal vents.
- _____ 20. Manganese nodules are currently being mined as an important source of manganese, copper, nickel, phosphate and cobalt.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. Surface ocean currents bring _____ water toward the polar regions and _____ toward the equatorial regions.
22. _____ is the total mass of living organisms in a given area.
23. Tides are produced by the _____ of the Sun and Moon on Earth.
24. _____ occur when water piles up at a shoreline as strong winds push waves into the coast.
25. Surface currents are the result of three things: _____, _____, and _____.
26. Surface ocean currents create loops called _____.

27. The _____ is a river of warm water in the Atlantic ocean that moderates northern temperatures.
28. A _____ is a manned vehicle that can visit the bottom of the ocean.
29. Corals and other animals deposit calcium carbonate to create _____ near the shore.
30. Marine mammals cannot live entirely in the aphotic zone because they must come to the surface to _____.

Short Answer

Answer each question in the space provided.

31. Briefly describe the three sources of food energy in the oceans.

32. Describe how atolls form.

33. What is the purpose of these four traits to fish living in the oceans: gills, ectothermy, fins and scales?

Answer Key

1. b 2. b 3. b 4. c 5. a 6. b 7. a 8. c 9. c 10. d

11. true 12. true 13. false 14. false 15. true 16. true 17. false 18. false 19. false 20. false

21. warm; cool 22. biomass 23. gravitational attraction 24. storm surge 25. the global winds; the Coriolis effect; the shape of the ocean basins 26. gyres 27. Gulf Stream 28. submersible 29. reefs 30. breathe

31. Food may run off of the land to be used by marine creatures. Phytoplankton and marine plants turn solar energy into food energy by photosynthesis. Chemosynthetic bacteria can turn chemicals into food energy at hydrothermal vents.

32. Coral reefs form around a hotspot volcano in a warm region. Over time the volcano comes off the hotspot and begins to subside. The reef grows upward so that it is near the surface. Eventually the volcano erodes beneath the surface so that only the atoll can be seen at the surface.

33. Gills: extracting oxygen from water; ectothermy: to be the same temperature as the surrounding water, fins: for moving and steering; scales: for protection }

CHAPTER

15**HS Earth's Atmosphere Assessments****Chapter Outline**

- 15.1 THE ATMOSPHERE**
 - 15.2 ENERGY IN THE ATMOSPHERE**
 - 15.3 ATMOSPHERIC LAYERS**
 - 15.4 AIR MOVEMENT**
 - 15.5 EARTH'S ATMOSPHERE**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

15.1 The Atmosphere

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What are the two most common gases in the atmosphere?
 - a. hydrogen and oxygen
 - b. nitrogen and water vapor
 - c. hydrogen and nitrogen
 - d. oxygen and nitrogen
2. The most important gas(es) for life are
 - a. nitrogen and oxygen
 - b. oxygen and carbon dioxide
 - c. oxygen
 - d. nitrogen, oxygen and carbon dioxide
3. Photosynthesis
 - a. uses carbon dioxide and creates oxygen
 - b. uses oxygen and creates carbon dioxide
 - c. uses carbon dioxide and oxygen and creates food energy
 - d. uses food energy and creates carbon dioxide and oxygen.
4. On the Moon
 - a. birds couldn't breathe
 - b. birds couldn't fly
 - c. if birds said "cheap" they wouldn't be heard
 - d. all of these
5. An increase in air pollutant particles
 - a. would have no effect on the number of raindrops
 - b. would have an unknown effect on the number of raindrops
 - c. could produce more raindrops
 - d. might produce fewer raindrops

True or False

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

- _____ 6. The atmosphere protects Earth from harmful solar rays.
- _____ 7. Sound waves travel rapidly through empty space.
- _____ 8. Carbon dioxide is abundant in the atmosphere.

_____ 9. Ozone is a type of oxygen.

_____ 10. Weather on the Moon is always stormy.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

11. As you increase in altitude, air pressure _____ .

12. As oceans and lakes evaporate, _____ accumulates in the atmosphere.

13. As air rises, water vapor forms _____.

14. Near the surface, as air pressure rises, air density _____.

15. Molecules are packed more tightly together in air with higher _____.

Short Answer

Answer each question in the space provided.

16. On top of Old Smokey, you drink a bottle of water then close the lid. Back at sea level, you find that the bottle has collapsed. Explain what has happened.

17. Often when there is cloud cover, daytime temperatures are lower and nighttime temperatures are higher. Why?

Answer Key

1. d 2. b 3. a 4. d 5. c

6. true 7. false 8. false 9. true 10. false

11. decreases 12. water vapor 13. clouds 14. increases 15. density

16. At higher altitudes, the air has less density. Back at sea level the denser air pushes against the sides of the bottle but the air inside the bottle is not dense enough to push back so the bottle collapses.

17. The clouds are like a blanket. They keep out some of the sun's heat so daytime temperatures are cooler. They hot in some of the heat that radiates of the surface at night so nighttime temperatures are warmer.}

15.2 Energy in the Atmosphere

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. When heat is transferred by the movement of electromagnetic waves it is called
 - a. convection
 - b. conduction
 - c. radiation
 - d. none of these
2. Electromagnetic spectrum
 - a. is all visible to humans
 - b. has the highest energy at the short wavelengths.
 - c. has the highest energy in the infrared.
 - d. is only able to travel through material
3. The vertical movement of air due to the uneven heating is called
 - a. convection
 - b. reflection
 - c. conduction
 - d. refraction
4. Wavelengths that are short and very high energy are
 - a. infrared
 - b. radio waves
 - c. ultraviolet
 - d. visible light
5. Incoming solar radiation may
 - a. reflect back into space
 - b. be absorbed by clouds
 - c. strike the ground
 - d. all of these
6. If you add heat to a gas, the molecules
 - a. split apart
 - b. combine into more complex molecules
 - c. vibrate more rapidly
 - d. collide less frequently
7. When ice melts to become water, the energy released is known as
 - a. specific heat

- b. latent heat
- c. insolation
- d. ultraviolet radiation

8. Wavelengths of sunlight passing through the atmosphere

- a. all reach Earth's surface
- b. may be filtered out by insolation, conduction, convection and radiation
- c. may be filtered out by ozone, oxygen, water or carbon dioxide
- d. are all absorbed in the atmosphere

9. At winter solstice, the sun's rays hit most directly at

- a. the Equator
- b. the Tropic of Cancer
- c. the Tropic of Capricorn
- d. the South Pole

10. Earth owes its moderate temperature to

- a. greenhouse effect
- b. insolation
- c. the tilt of its orbital axis
- d. the variety of wavelengths of energy from the sun

True or False

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

- _____ 11. The polar regions are colder than the equator because they have higher insolation.
- _____ 12. Visible light makes up the least energetic waves on the electromagnetic spectrum.
- _____ 13. The energy added or removed when an object changes state is latent heat.
- _____ 14. Water has very high specific heat, but the specific heat of ice is very low.
- _____ 15. The North magnetic pole axis points toward Polaris.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. Light, radio waves and gamma rays are examples of _____.
17. The transfer of heat between two objects by electromagnetic waves is known as _____.
18. Infrared energy is also known as _____.
19. Wavelengths with just higher energy than visible light are _____ radiation.
20. When you get a sunburn, it is mostly caused by _____ radiation.

Short Answer

Answer each question in the space provided.

21. Draw a diagram and label Earth and Sun at summer solstice and at winter solstice.

22. Methane levels are 2.5 times higher and carbon dioxide 35% higher than in about 1950. How did this increase occur? Why is this important? What is the effect?

Answer Key

1. c 2. b 3. a 4. c 5. c 6. c 7. b 8. c 9. c 10. a

11. false 12. false 13. true 14. false 15. false

16. electromagnetic waves 17. conduction 18. heat 19. ultraviolet 20. UVA

21. See image in "Northern Hemisphere Summer" and "Northern Hemisphere Winter" sections of text with images "Summer solstice in the Northern Hemisphere" and "In Southern Hemisphere summer, the Sun's rays directly strike the Tropic of Capricorn...".

22. Methane and carbon dioxide are greenhouse gases, and they have been increased in the atmosphere by human activities. Increasing greenhouse gas levels in the atmosphere means that more heat can be trapped. This means that the atmosphere is warmer. Weather and eventually climate will be affected by the warmer atmosphere.}

15.3 Atmospheric Layers

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A change in temperature with distance is known as
 - a. gradation
 - b. temperature distance
 - c. high to low temperature
 - d. temperature gradient
2. Days with inversions may have high pollution because
 - a. they are cold and people use more fossil fuels.
 - b. the air is stable and more pollutants can get trapped.
 - c. they are warm and the air conditioners are running.
 - d. none of these.
3. The Van Allen radiation belts are
 - a. found in the ionosphere.
 - b. zones of highly charged particles.
 - c. the source of the solar wind.
 - d. all of these.
4. What layer of the atmosphere has the lowest temperature?
 - a. Troposphere
 - b. Stratosphere
 - c. Mesosphere
 - d. Thermosphere
5. In the troposphere, temperature _____ with altitude because _____.
 - a. decreases; heat radiates from the ground
 - b. decreases; heat comes from the sun
 - c. increases; heat comes from the sun
 - d. increases; heat radiates from the ground
6. In the stratosphere, temperature _____ with altitude because _____.
 - a. decreases; heat radiates from the ground
 - b. decreases; heat comes from the sun
 - c. increases; heat comes from the sun
 - d. increases; heat radiates from the ground
7. If you are lucky enough to see a shooting star (meteor), the light you are seeing is in the
 - a. Troposphere

- b. Stratosphere
 - c. Mesosphere
 - d. Thermosphere
8. The ozone layer protects life on Earth from
- a. the Sun's high energy ultraviolet radiation.
 - b. global warming.
 - c. the Sun's intense heat.
 - d. none of these.
9. An inversion
- a. has warm air above cold air.
 - b. has cold air above warm air.
 - c. is unstable.
 - d. none of these.
10. Why would you get burns in the mesosphere (if you weren't in a protective suit)?
- a. there are not enough gas molecules to protect you.
 - b. the ozone layer is below you.
 - c. the ions of the mesosphere are high energy and can burn you
 - d. none of these
11. In the thermosphere, the air feels very _____ because _____.
- a. cold; there are so few gas molecules.
 - b. hot; it is close to the sun.
 - c. hot; it is above most of the atmosphere.
 - d. b c
12. The lights of the aurora are caused by
- a. the Van Allen belts.
 - b. convection in the ionosphere.
 - c. the magnetic field.
 - d. energized gas molecules.

True or False

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

- _____ 13. The ionosphere gets its name because it contains ionized gas molecules and freed electrons.
- _____ 14. Warm gas molecules take up more space than cooler gas molecules.
- _____ 15. Warmer air is more buoyant than cooler air, which is why the warmer air rises above the cooler air.
- _____ 16. The temperature gradient of each layer within the atmosphere is the same.
- _____ 17. Gravity pulls the gas molecules towards Earth's center, which is why it's easier to breathe closer to sea level than at the top of a tall mountain.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The ionized layer of the atmosphere is the _____.
19. The ozone layer is in the _____ layer in the atmosphere
20. Pilots like to fly in the _____ layer of the atmosphere because there is little air turbulence.
21. When air warms, its density _____ and it moves vertically _____ in the atmosphere.

22. The outermost layer of the atmosphere is the _____.
23. Reactions between ions released from solar storms and Earth's magnetic field cause a(n) _____ near the poles.
24. Virtually all weather takes place in the _____ layer of the atmosphere.
25. High speed protons and electrons flinging through space make up the _____.

Short Answer

Answer each question in the space provided.

26. Describe the temperature gradient of the troposphere. Is this condition stable or unstable? What is the consequence of this?

27. How does UV radiation damage cells and organisms?

Answer Key

1. d 2. b 3. b 4. c 5. a 6. c 7. c 8. a 9. a 10. b 11. a 12. d
13. true 14. true 15. true 16. false 17. true
18. ionosphere 19. stratosphere 20. stratosphere 21. decreases; upward 22. exosphere 23. aurora 24. troposphere 25. solar wind
26. The air is warmer at the base of the troposphere so warm air is below cooler air. Cold air is more dense and should sink so this situation is unstable. There is convection since the cold air sinks and the warm air rises. The rising and sinking of air results in the planet's weather.
27. UV is very high energy. It can penetrate cells and damage their DNA, which leads the cells to die. Organisms will die with heavy UV exposure since their cells die.}

15.4 Air Movement

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A low pressure zone forms
 - a. warm air rises
 - b. cold air rises
 - c. water evaporates
 - d. cold and warm air rapidly mix
2. Frigid winds that blow from a plateau through gaps in mountains are
 - a. Katabatic winds.
 - b. Chinook winds.
 - c. Santa Ana winds.
 - d. Foehn winds.
3. Most air movement occurs in which atmospheric layer?
 - a. Troposphere
 - b. Stratosphere
 - c. Mesosphere
 - d. Thermosphere
4. Where do haboobs form?
 - a. in the middle of a sand storm
 - b. in the downdrafts on the front of a thunderstorm
 - c. in the updrafts behind a thunderstorm
 - d. all of these.
5. Advection occurs when
 - a. warm air rises.
 - b. cool air sinks.
 - c. air flows from high to low pressure.
 - d. air flows from low to high pressure.
6. Rain is most likely to fall as an air mass
 - a. descends down a mountain range.
 - b. rises up a mountain range.
 - c. rises over the desert.
 - d. none of these
7. Dry, descending air that lost its moisture as it rose up over a mountain range creates
 - a. Katabatic winds.

- b. mountain breezes.
 - c. Santa Ana winds.
 - d. deserts due to rainshadow effect.
8. Because of Coriolis effect
- a. warm air rises at the equator and cold air sinks at the poles.
 - b. there are three global circulation cells in the northern hemisphere and three in the southern hemisphere.
 - c. air moves counterclockwise in the northern hemisphere and clockwise in the southern hemisphere.
 - d. all of these.
9. Wind in the circulation cells blows
- a. north to south or south to north
 - b. east to west or west to east
 - c. northeast to southwest or southwest to northeast
 - d. southeast to northwest or northeast to southwest
10. The time for an airplane to fly between San Francisco and New York relative to NY to SF is
- a. greater due to the westerly winds.
 - b. less due to the westerly winds.
 - c. greater due to the easterly winds.
 - d. less due to the easterly winds.
11. Precipitation is high
- a. in low pressure areas where air is sinking.
 - b. in high pressure areas where air is rising.
 - c. in high pressure areas where air is sinking.
 - d. in low pressure areas where air is rising.
12. Weather differences between winter and summer in the United States are partly due to
- a. the location of the polar jet stream.
 - b. the location of the Intertropical Convergence Zone.
 - c. the storm pattern.
 - d. none of these.

True or False

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

- _____ 13. The westerly winds travel toward the west.
- _____ 14. Cool air sinking creates a high pressure zone at the ground.
- _____ 15. Wind is created by air that moves vertically between high and low pressure zones.
- _____ 16. Walking on the beach in San Diego in December, one would likely feel a strong sea breeze coming off the ocean.
- _____ 17. Air on mountain slopes is heated more than air at the same elevation over an adjacent valley.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The basis for much of this chapter is that warm air _____ and cool air _____.
19. In the fall and winter, the _____ blow east to west in Southern California.
20. A wind that blows from a mountain to a valley at night when mountain air is cooler is called a(n) _____.
21. Wind blows from _____ zones to _____ zones.

22. A(n) _____ occurs at the meeting zone between cold continental air and subtropical air.
23. _____ are winds that move downslope.
24. Lower density air rises in a(n) _____.
25. Fast flowing air at the boundary of two circulation cells is called a(n) _____.

Short Answer

Answer each question in the space provided.

26. What causes the Hadley cells? How does the air move within the cell? How do temperature and pressure change as the air moves?

27. How do sea breezes form? How do land breezes form? Why are monsoons really just large versions of these winds?

Answer Key

1. a 2. a 3. a 4. b 5. d 6. c 7. d 8. b 9. c 10. b 11. d 12. a
13. false 14. true 15. false 16. false 17. true
18. rises; sinks 19. Santa Ana winds 20. mountain breeze 21. high pressure to low pressure 22. front 23. katabatic winds 24. low pressure zone 25. jet stream
26. Solar energy warms air at the equator so it rises. This creates a low pressure zone. The air moves to the top of the troposphere and then outward to create the top of the cell. All along the way, it cools. At around 30-degrees N and S of the equator, the air begins to sink. As it descends, it warms, and the pressure rises. Finally the air moves along the ground from high to low pressure, continuing to warm as it goes.
27. In the summer, the land surface is warmer than the sea surface. The warm air rises and sucks cooler sea air in. This is a sea breeze. In the winter, the sea is warmer than the land. The warm air above the sea rises and sucks cooler

air from the land out to sea. This is a land breeze. Monsoon winds blow in the same directions for the same reasons. Where monsoons are intense in the summer, the land is very hot relative to the sea.}

15.5 Earth's Atmosphere

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The amount of energy needed to change a material from one physical state to another is called:
 - a. boiling point
 - b. latent heat
 - c. specific heat
 - d. dew point
2. The seasons are caused by
 - a. the direction Earth's axis is pointing relative to the Sun.
 - b. greenhouse gases
 - c. where Earth is in its elliptical orbit.
 - d. where the sun is in its sunspot cycle
3. What is the amount of water vapor in the air called?
 - a. temperature
 - b. wind speed
 - c. humidity
 - d. altitude
4. What is the force of air weighing down over a unit of area called?
 - a. air pressure
 - b. air density
 - c. air temperature
 - d. none of these
5. Which layer of the atmosphere do pilots prefer to fly in?
 - a. thermosphere
 - b. mesosphere
 - c. stratosphere
 - d. troposphere
6. Land breezes blow when
 - a. warmer ocean air flows over land
 - b. warmer land air flows over the ocean
 - c. cooler ocean air flows over land
 - d. cooler land flows over the ocean
7. A surface with high albedo
 - a. turns light into heat.

- b. reflects light back.
 - c. allows light to pass through.
 - d. none of these
8. What does it mean to say that water has high specific heat?
- a. It takes a lot of energy to raise the temperature of one gram of water by 1-degree C.
 - b. The temperature of water stays relatively constant.
 - c. Large bodies of water can keep the weather more moderate.
 - d. all of these.
9. The temperature gradient of the troposphere means that
- a. the troposphere is very unstable.
 - b. the troposphere is extremely stable.
 - c. the troposphere is prone to inversions.
 - d. the troposphere is prone to rising into the stratosphere.
10. The global winds are created by
- a. convection in the two major circulation cells.
 - b. Coriolis effect.
 - c. advection in the six major circulation cells.
 - d. the location of the jet stream.

True or False

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

- _____ 11. Photosynthesis is the process through which CO₂ is created and energy is released.
- _____ 12. High temperature particles vibrate faster than low temperature particles.
- _____ 13. The moon is bright because it radiates visible light.
- _____ 14. Hot strong winds blowing from the east sometimes create fire hazards in the mountains of Southern California.
- _____ 15. Most of the energy that reaches the Earth's surface comes from the Sun.
- _____ 16. Ozone filters UV but the rest of the sun's radiation comes in unimpeded.
- _____ 17. The trade winds got their name because they are so strong people want to trade them for weaker winds.
- _____ 18. When the north pole is tilted toward the sun, it is winter in the southern hemisphere.
- _____ 19. Heat is held in the atmosphere by greenhouse gases.
- _____ 20. During a night time aurora, different gases will emit a different color of light.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. In _____, animals use oxygen to convert sugar into food energy they can use.
22. The _____ is made of high speed particles, mostly protons and neutrons, traveling outward from the sun.
23. In a _____, dense air sinks causing cool temperatures.
24. _____ creates some deserts, as air descending down a mountain becomes dry and hot.
25. We feel _____ energy as heat.
26. When the Sun's rays shine most directly at the equator this is called the _____.

27. _____ is a greenhouse gas produced by rotting plants.
28. Ions traveling along magnetic field lines can create waves of brilliant colors called the _____ .
29. _____ winds are large scale versions of land and sea breezes.
30. _____ winds develop when air is forced up over a mountain range.

Short Answer

Answer each question in the space provided.

31. What is a temperature inversion? How do they form?
32. What is the ozone layer? Why is the ozone layer important?
33. Describe the situation that creates the westerly winds (which travel from southwest to northeast) in the mid-latitudes.

Answer Key

1. b 2. a 3. c 4. a 5. c 6. d 7. b 8. d 9. a 10. c

11. false 12. true 13. false 14. false 15. true 16. false 17. false 18. true 19. true 20. true

21. respiration 22. Solar wind 23. high pressure cell 24. rainshadow effect 25. infrared 26. equinox 27. methane
28. aurora 29. monsoon 30. chinook

31. An inversion is a stable situation in which cold dense air lies below warmer more buoyant air. An inversion may form when the ground is very cold and cools the air above it. Then cold air will be sitting below warmer air.

32. The ozone layer is a layer in the stratosphere that has higher than average ozone. Ozone absorbs harmful high-energy UV radiation so that it protects life on Earth. High energy UV can damage DNA and lead to cell death.

33. The westerly winds are one of the global wind belts. They are in the Ferrell, or mid-latitude cell. The winds move from the high pressure at around 30-degrees north to the low pressure at around 60-degrees north. They do not blow from south to north directly because Coriolis effect has them bending to the right in the Northern Hemisphere so they travel from southwest to northeast. }

CHAPTER **16** HS Weather Assessments

Chapter Outline

16.1 WEATHER AND ATMOSPHERIC WATER

16.2 CHANGING WEATHER

16.3 STORMS

16.4 WEATHER FORECASTING

16.5 WEATHER

- The answer keys can be found in the Resource tab above the Table of Contents.

16.1 Weather and Atmospheric Water

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

- Clouds have a big influence on weather by
 - preventing solar radiation from reaching the ground
 - absorbing warmth that is re-emitted from the ground
 - being a source of precipitation
 - all of the above
- Local weather depends on which of the following?
 - air temperature
 - humidity
 - wind speed and direction
 - all of the above
- The percentage of water vapor in a certain volume of air relative to the maximum amount of water vapor that air could contain is known as
 - maximum humidity
 - humidity
 - relative humidity
 - percent humidity
- When humid air near the ground cools below its dew point, what forms?
 - vog
 - fog
 - rain
 - smog
- When warm moist air rises it eventually
 - cools and reaches its dew point.
 - becomes hot and begins to rain.
 - cools and becomes able to hold more water vapor.
 - none of these.
- Clouds are visible because
 - water vapor is visible.
 - they are made of tiny condensed water droplets.
 - they are made of ice crystals.
 - none of these.
- If the weather report says there is 90% humidity, it means that the air

- a. is 90% water vapor.
 - b. is 10% water vapor.
 - c. has 10% as much water vapor as it could hold.
 - d. has 90% as much water vapor as it could hold.
8. When the sky is cloud-free,
- a. days are relatively warm; nights are relatively cold.
 - b. days and nights have a relatively small temperature difference.
 - c. the humidity increases both day and night.
 - d. none of these.
9. Clouds form when
- a. humidity increases but air temperature stays the same.
 - b. air temperature increases, but humidity stays the same.
 - c. the air reaches its cloud point.
 - d. all of these.
10. San Francisco has its famous fog when
- a. warm air from the San Francisco Bay meets with cold air from the Pacific Ocean.
 - b. warm air from the ground travels up the hills and cools to its dew point.
 - c. warm air from the Pacific cools over the cold California current.
 - d. the ground becomes cold enough that the layer of air near the ground reaches its dew point.

True or False

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

- _____ 11. Clouds grow tall because of strong upward vertical air currents.
- _____ 12. A particular location's weather does not depend on wind direction.
- _____ 13. Climate is the average of a region's weather over time.
- _____ 14. Hurricane Katrina made a direct hit on New Orleans, which is why it did so much damage.
- _____ 15. Anything over 85% humidity, and the water condenses and forms precipitation.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The _____ occurs when the air has 100% humidity.
17. _____ clouds, like cirrus, are made of ice crystals.
18. Air that is _____ in temperature can hold more water vapor than air that is _____ in temperature.
19. A location's weather depends on air temperature and air _____.
20. Precipitation falls when humidity reaches _____.
21. Before you see lightning and hear thunder, you will probably see _____ clouds.
22. On a cool autumn morning, the fog that appears over a lake is called _____ fog.
23. If rain hits a layer of freezing air near the ground it becomes _____.

Short Answer

Answer each question in the space provided.

24. How do clouds influence weather?

25. How does a hailstone form? When does it fall?

Answer Key

1. d 2. d 3. c 4. b 5. a 6. b 7. d 8. a 9. a 10. c

11. true 12. false 13. true 14. false 15. false

16. dew point 17. high 18. warm; cold 19. pressure 20. 100% 21. cumulonimbus 22. steam fog 23. sleet

24. Clouds provide insulation so clouds absorb warmth that is emitted from the ground, which can warm temperatures. Clouds prevent solar radiation from reaching the ground, which can cool temperatures. Clouds are also the source of precipitation.

25. An ice particle travels around in a cumulonimbus cloud with strong updrafts. Layers of ice form around the particle. When it finally becomes so heavy it can escape from the rising air currents, it falls. }

16.2 Changing Weather

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A warm front occurs when
 - a. a cold air mass slides over a warm air mass
 - b. two warm air masses meet
 - c. two cold air masses meet
 - d. a warm air mass slides over a cold air mass
2. An occluded forms around what feature?
 - a. warm front
 - b. cold front
 - c. high pressure system
 - d. low pressure system
3. A cold front in winter will produce
 - a. thunderstorms and tornadoes
 - b. strong rain
 - c. cold temperatures and heavy snow
 - d. cold temperatures but clear or slightly cloudy skies
4. Two air masses meet at what?
 - a. a convergence point
 - b. a front
 - c. a medium
 - d. a division point
5. Air masses usually do not form in the temperate zones because
 - a. the region is too unstable.
 - b. the area is not hot or cold enough to affect the air.
 - c. there is too much rain in the mid-latitudes.
 - d. none of these.
6. Which directions do air masses tend to flow?
 - a. cold toward the poles; warm toward the equator
 - b. warm toward the poles; cold toward the equator
 - c. east-west in the global wind belts
 - d. north-south in the global circulation cells
7. What happens when a warm air mass and a cold air mass meet?
 - a. the denser air mass goes beneath the less dense air mass

- b. the less dense air mass goes beneath the denser air mass
 - c. it depends on many factors, only one of which is density
 - d. the two air masses will create a squall line
8. The strongest winds form when
- a. there is a lot of precipitation
 - b. the temperature difference between two air masses is very low.
 - c. the temperature difference between two air masses is very high.
 - d. there is no precipitation
9. Rising air creates
- a. high pressure
 - b. temperature differences
 - c. low pressure
 - d. fronts
10. Compared to a cold front, the change in weather at a warm front is
- a. really quick since the front is steep.
 - b. gradual since the angle of the front is shallow.
 - c. about the same, since the change from one air mass to the other occurs at about the same rate.
 - d. none of these
11. After a cold front passes and the cold air mass is over you
- a. thunderstorms or snow showers precipitate on you.
 - b. a squall line passes overhead.
 - c. the weather is cold and clear or partly cloudy.
 - d. tornadoes and thunderstorms form.
12. Thunderstorms tend to form
- a. in summer and autumn
 - b. in autumn and winter
 - c. in winter and spring
 - d. in spring and summer

True or False

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

- _____ 13. Fronts are always moving.
- _____ 14. An air mass is a batch of air that has very similar temperature and humidity.
- _____ 15. Air masses generally form over a relatively small area.
- _____ 16. A front is the meeting of two air masses that have different densities and do not easily mix.
- _____ 17. An occluded front has three air masses: cold, warm, then cold.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A cold front takes over a warm front in a(n) _____.
19. A warm air mass will replace a cold air mass in a _____.
20. A front occurs that the meeting of one _____ with another.
21. The one air mass that forms within North America is cT, which stands for _____.
22. Most stormy weather occurs at _____.

23. Air masses do not move at a(n) _____.
24. The boundary where fronts meet curves due to _____.
25. The Pacific Coast has frequent winter storms with lots of precipitation and shifting winds because it has a lot of _____.

Short Answer

Answer each question in the space provided.

26. How and where do air masses form?

27. Imagine that it is a winter day and a warm front comes over you. What is the sequence of clouds and weather that you can observe?

Answer Key

1. d 2. d 3. c 4. b 5. a 6. b 7. a 8. c 9. c 10. b 11. c 12. d
13. false 14. true 15. false 16. true 17. true
18. occluded front 19. warm front 20. air mass 21. continental tropical 22. fronts 23. stationary front 24. Coriolis Effect 25. occluded fronts
26. Air masses form where the air is stable for long enough for it to take on the characteristics of the land or water beneath it, primarily in high pressure zones. Air masses mostly form in polar or tropical regions since the air there is more stable.
27. You are in cold air but the warm air mass is above you. There are high cirrus clouds at the boundary. As the front moves toward you the clouds become thicker and cirrostratus clouds form. Right at the front there are altocumulus and altostratus clouds in the gray sky. Snow falls. When the air gets warmer, the snow turns to sleet and freezing rain. There are stratus clouds and fog due to the mixing of warm and cold air. }

16.3 Storms

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A blizzard is not described by which of the following conditions?
 - a. temperatures below 20°F
 - b. winds greater than 35 mph
 - c. relative humidity near 100%
 - d. visibility less than one mile
2. People in the United States are most likely to experience
 - a. thunderstorms
 - b. tornadoes
 - c. hurricanes
 - d. nor'easters
3. What is needed for a thunderstorm to form?
 - a. high ground temperature
 - b. high air temperature
 - c. low air temperature
 - d. low ground temperature
4. The categories of the Saffir-Simpson Hurricane Scale are divided by
 - a. the amount of precipitation
 - b. the wind speed
 - c. the amount of precipitation and the wind speed
 - d. the amount of damage done
5. Which of the following is true?
 - a. You hear thunder before you see lightning.
 - b. You hear thunder and see lightning at the same time.
 - c. You see lightning before you hear thunder.
 - d. The arrival time of sound and light waves is random.
6. Convection in a thunderstorm dies when
 - a. all the raindrops have fallen and no new ones can be created.
 - b. the cloud grows up into the stratosphere and the air cools and stops convection.
 - c. downdrafts cool the base of the cloud so air doesn't rise.
 - d. none of these
7. Thunderstorms that last for several hours do so because
 - a. there are more particulates for drops to condense on.

- b. intense downdrafts bounce off the ground and send warm air back into the cloud.
 - c. they are fed by the intense cycling air of tornadoes.
 - d. none of these.
8. Tornadoes are common in the late spring when
- a. warm wet air from the south meets cold dry air from the north.
 - b. hurricanes come off of the Atlantic and onto land.
 - c. nor-easters come off of the Atlantic and onto land.
 - d. none of these
9. The eye of a hurricane is relatively calm because
- a. it is located at the end of the storm
 - b. there is a lot of precipitation so air motion is downward
 - c. it is a high pressure
 - d. none of these
10. Why do so many hurricanes move toward the U.S., but then change direction and move out to sea?
- a. Hurricanes move away from land as much as possible.
 - b. Hurricanes move with the global winds.
 - c. Hurricanes move away from the Gulf Stream.
 - d. none of these
11. Many blizzards form when
- a. a northern cold air mass meets a warmer, wetter southern air mass.
 - b. when the jet stream is north of its normal winter position.
 - c. strong winds push ocean air into cold continental regions.
 - d. none of these
12. Frigid air warms and collects moisture over the Great Lakes, so that downwind the air
- a. warms the region and rain falls.
 - b. warms the region and skies clear.
 - c. cools and creates a nor'easter.
 - d. cools and drops lots of snow.

True or False

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

- _____ 13. Lightning never strikes the same place twice.
- _____ 14. For a heat wave to be declared anywhere in the United States, the temperature must be at least 86°F (30°C) for at least three days.
- _____ 15. Thunderstorms can form individually or in squall lines along a warm front.
- _____ 16. Lightning heats the air so that it expands explosively.
- _____ 17. If there were no thunderstorms in Kansas, there would be no tornadoes there either.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. _____ snow takes place leeward from when warm moist air enters into a cold front.
19. A(n) _____ is a cyclone that forms at the polar front.
20. A _____ forms downward from a cumulonimbus cloud.
21. The winds in a _____ rotates in a clockwise direction in the northern hemisphere and a counter clockwise pattern in the southern hemisphere.

22. A period of prolonged excessively hot weather for a particular region is called a(n) _____.
23. A wind system that rotates around a low pressure center is a(n) _____.
24. Mid-latitude cyclones in the U.S. that come off the Atlantic Ocean are called _____.
25. For a _____ to form, sea surface temperature must be 28°C (82°F) or higher.

Short Answer

Answer each question in the space provided.

26. How does a cumulonimbus cloud form?

27. How does a hurricane form?

Answer Key

1. c 2. a 3. a 4. b 5. c 6. c 7. b 8. a 9. d 10. b 11. a 12. d

13. false 14. false 15. false 16. true 17. true

18. lake-effect 19. mid-latitude cyclone 20. tornado 21. anticyclone 22. heat wave 23. cyclone 24. nor'easter 25. tropical depression

26. The hot ground warms the air above it, which rises. Water vapor condenses to form a cloud; latent heat from the phase change provides energy to warm the cloud. Water droplets go up in updrafts, when they get heavy they fall, starting a downdraft. This creates a convection cell. The cloud grows upward into a cumulonimbus giant.

27. When sea surface temperature reaches 28°C (82°F) or higher, it creates a low pressure. The rising air rotates counterclockwise (in the Northern Hemisphere) around the low pressure. Water vapor condenses from the rising air and latent heat energy is released. If wind shear is low the storm can become a hurricane in two to three days. }

16.4 Weather Forecasting

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Lines of equal temperature are called what?
 - a. isosceles
 - b. isotacs
 - c. isobars
 - d. isotherms
2. Which of the following is radar named for?
 - a. Radio Detection and Ranging
 - b. Lt. Col. Joseph P. Radar
 - c. Radio Readings and Wind Direction
 - d. Radio Direction and Readings
3. What does a radiosonde measure?
 - a. temperature
 - b. pressure
 - c. humidity
 - d. all of the above
4. What instrument measures atmospheric pressure?
 - a. thermometer
 - b. barometer
 - c. scale
 - d. sundial
5. What will probably happen if barometric pressure rises?
 - a. a storm is on its way
 - b. conditions will remain the same as they are
 - c. the skies will clear
 - d. its not possible to say
6. To outline a storm and estimate its effects, meteorologists use
 - a. satellites
 - b. weather maps
 - c. radar
 - d. none of these
7. On a weather map, isolines are created
 - a. by connecting points of equal value

- b. by identifying high and low pressure cells
 - c. at the location of a front.
 - d. none of these
8. A large temperature gradient may indicate a(n)
- a. front
 - b. isotherm
 - c. low pressure cell
 - d. none of these
9. Low or high pressure cells are indicated by
- a. the lowest or highest temperatures
 - b. the lowest or highest wind speeds
 - c. closed isobars
 - d. none of these
10. Where isotach values are very low up high in the troposphere
- a. the jet stream can be located
 - b. a tropical cyclone may develop
 - c. snow is likely to fall
 - d. none of these

True or False

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

- _____ 11. Radiosondes produce a profile of weather conditions in the atmosphere.
- _____ 12. Weather predictions are virtually always right.
- _____ 13. The least accurate weather forecasts are those made for several days into the future.
- _____ 14. Barometers are used to measure wind speeds.
- _____ 15. Weather stations have thermometers, barometers, and other measuring devices to monitor weather up high above them in the atmosphere.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The most advanced weather forecasts are done by _____.
17. On the warm side of the 0°C (32°F) isotherm, the precipitation would be _____.
18. To monitor large scale weather systems, it is best to use a(n) _____.
19. The instrument for measuring atmospheric pressure is a _____.
20. _____ on a map show areas of equal wind speed.
21. _____, first used in WWII, uses the reflection of radio waves to determine disturbances.
22. Lines of equal average air pressure at sea level are _____.
23. Scientists who forecast weather are _____.

Short Answer

Answer each question in the space provided.

24. How are weather models calculated and made into a long-term weather prediction?

25. Why are weather predictions so much more detailed and accurate than they were 50 years ago?

Answer Key

1. d 2. a 3. d 4. b 5. c 6. c 7. a 8. a 9. c 10. b

11. true 12. false 13. true 14. false 15. false

16. Numerical Weather Prediction 17. rain 18. satellite 19. barometer 20. isotachs 21. radar 22. isobars 23. meteorologists

24. Weather data is plugged into supercomputers that calculate the future over a grid that can have spacings of between 10 and 200 km. The computer model can project further into the future.

25. The technology is better. Satellites can see storms visually but also can measure conditions from above. Computers can consume tremendous amounts of data and create a model of the future.}

16.5 Weather

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. In the Northern Hemisphere, the general direction of the flow of the jet stream is toward the
 - a. north
 - b. south
 - c. east
 - d. west
2. The layer of the atmosphere in which weather change occurs is the
 - a. mesosphere
 - b. troposphere
 - c. thermosphere
 - d. stratosphere
3. Which type of front occurs when the air masses do NOT move?
 - a. cold
 - b. warm
 - c. stationary
 - d. occluded
4. Which of the following is a product of thunderstorms?
 - a. tornadoes
 - b. hurricanes
 - c. typhoons
 - d. cyclones
5. What are the most damaging storms on Earth?
 - a. tropical depressions
 - b. hurricanes
 - c. nor'easters
 - d. cyclones
6. The transfer of heat that takes place when fluids (gases and liquids) are unevenly heated is called
 - a. reflection
 - b. conduction
 - c. radiation
 - d. convection
7. What is the deadliest weather phenomena?
 - a. heat waves

- b. blizzards
 - c. hurricanes
 - d. tsunamis
8. Which of the following instruments measures air pressure?
- a. tachyometer
 - b. radiosonde
 - c. thermometer
 - d. barometer
9. What clouds are towering clouds with anvil heads that bring thunderstorms?
- a. Nimbostratus
 - b. Cirrocumulus
 - c. Cumulonimbus
 - d. Cirrus
10. The eye of a hurricane is a
- a. high pressure cell
 - b. low pressure cell
 - c. tropical depression
 - d. tropical cyclone

True or False

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

- _____ 11. Radiation is the transfer of energy from one object to another through electromagnetic waves.
- _____ 12. Weather maps depict information only from computer models.
- _____ 13. Isotherms show temperature gradients.
- _____ 14. Isobars are lines of constant wind speed.
- _____ 15. Heat waves have decreased in frequency and duration in recent years.
- _____ 16. An F6 tornado would cause massive destruction wherever it touches the ground.
- _____ 17. A summer heat wave can result if the jet stream stays too far north.
- _____ 18. Air masses form mainly in high pressure zones.
- _____ 19. Low level winds push air masses.
- _____ 20. Because of the stability of temperature inversions, they often produce healthy air in cities.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. _____ is the percentage of water vapor a certain volume of air contains relative to the maximum amount it can contain.
22. The temperature at which air becomes saturated with water is called _____.
23. _____ is a cloud located at or near the ground.
24. An _____ is a batch of air that has nearly the same temperature and humidity.
25. Two air masses meet at a _____.
26. A _____ is a system of winds rotating counterclockwise around a low pressure system in the northern hemisphere.

27. _____ contains instruments that measures: wind speed, temperature, wind direction, humidity and precipitation.
28. _____ are often located around a tropical depression.
29. At a _____, a cold air mass forces a warmer air mass upwards.
30. The Sun is directly overhead at the equator at the time of year called _____.

Short Answer

Answer each question in the space provided.

31. How do clouds influence weather?
32. List the 4 types of fronts and explain the weather associated with each.
33. How is weather predicted? Why is it so difficult to predict the weather?

Answer Key

1. c 2. b 3. c 4. a 5. b 6. d 7. a 8. d 9. c 10. b

11. false 12. false 13. false 14. false 15. true 16. false 17. true 18. true 19. true 20. false

21. relative humidity 22. dew point 23. fog 24. air mass 25. front 26. cyclone 27. weather stations 28. Thunderstorms 29. cold front 30. equinox

31. Clouds prevent solar radiation from reaching the ground so they keep the ground cooler. On the other hand, they absorb warmth that is re-emitted from the ground, so they insulate the planet. Clouds are the source of precipitation.

32. Four types of fronts:

- Stationary front – rain, drizzle, and fog
- Cold front – rain showers, snow showers, or thunderstorms with blustery winds – depends on the season
- Warm front – snow will turn to sleet and freezing rain.
- Occluded Front – precipitation and shifting wind.

33. Weather conditions are monitored at weather stations or on radiosondes. These data points are connected to identify the location of pressure cells and fronts. Satellites are used to get a bigger picture; e.g. where a hurricane might be heading. Weather is difficult to predict because it is a complex and chaotic system. }

CHAPTER **17** HS Climate Assessments

Chapter Outline

- 17.1 CLIMATE AND ITS CAUSES**
 - 17.2 WORLD CLIMATES**
 - 17.3 CLIMATE CHANGE**
 - 17.4 CLIMATE**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

17.1 Climate and Its Causes

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The most solar radiation over a year strikes
 - a. the north and south pole
 - b. the tropic of cancer and tropic of capricorn
 - c. the equator
 - d. the north pole
2. At the ITCZ,
 - a. there is a lot of wind.
 - b. air rises and precipitation falls.
 - c. the Hadley and Ferrell circulation cells meet.
 - d. all of these.
3. At about 30°N and 30°S, the air is warm and dry because
 - a. it originated at the equator.
 - b. it is a high pressure zone.
 - c. it is a zone of evaporation.
 - d. all of these.
4. What does ITCZ stand for?
 - a. Inter Terrestrial Conic Zone
 - b. Infrared Terrain Conjoined Zone
 - c. Inter Tropical Convergence Zone
 - d. None of the above
5. What latitudes are sometimes known as horse latitudes?
 - a. 30 N and 30 S
 - b. 45 N and 45 S
 - c. at the equator
 - d. above 85 N and below 85 S
6. The polar jet stream
 - a. is very near the north or south pole.
 - b. is where air in the circulation cells is descending.
 - c. is the meeting of two air masses with different temperatures.
 - d. all of these.
7. The prevailing winds are
 - a. the ground level portion of one of the circulation cells.

- b. where air in the circulation cells ascends or descends.
 - c. affected by local climate.
 - d. all of these.
8. Compared with lower altitudes, at higher altitudes the air molecules are
- a. less densely packed.
 - b. more densely packed.
 - c. the same density of packing.
 - d. packed with variable density.
9. The ITCZ is
- a. further north in the winter than in the summer.
 - b. further south in the winter than in the summer.
 - c. near the north pole in the summer and the south pole in the winter.
 - d. near the south pole in the summer and the north pole in the winter.
10. Where the two Hadley cells come together
- a. the Intertropical Convergence Zone is created.
 - b. the climate is warm and wet.
 - c. there are often no steady winds.
 - d. all of these.

True or False

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

- _____ 11. The ITCZ shifts to about 5-degrees north of the equator in the summer.
- _____ 12. The location of the major wind belts remains the same year round.
- _____ 13. Upwelling of deep water may raise the temperature of the nearby land in very cold locations.
- _____ 14. The sun is directly above the equator at the solstices.
- _____ 15. The latitude of a region affects how much solar radiation a region receives.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The horizontal movement of air is called advection or _____.
17. Weather averaged over the long term is called _____.
18. Coastal areas have a _____ climate.
19. In the _____, the descending air once meant that ships could be delayed for long periods.
20. Coastal _____ brings cold, deep water to the sea surface off of California.
21. Collisions between molecules give off _____, which warms the air.
22. Air temperature is lower at _____ altitude.
23. The amount of solar radiation a spot receives depends on its _____.

Short Answer

Answer each question in the space provided.

24. Describe the two ways that mountain ranges can affect climate.

25. Why do San Francisco, California; Wichita, Kansas; and Virginia Beach, Virginia have such different climates even though they are at about the same latitude?

Answer Key

1. c 2. b 3. d 4. c 5. a 6. c 7. a 8. a 9. b 10. d

11. true 12. false 13. true 14. false 15. true

16. wind 17. climate 18. maritime 19. horse latitudes 20. upwelling 21. heat 22. higher 23. latitude

24. Air travels up a mountain range and cools and loses its moisture so that when it is on the leeward side it is dry and as it descends it warms. This can cause rainshadow deserts. A mountain range can also separate the coastal area from the inland, keeping the moderating effect of the ocean from traveling inland.

25. The prevailing winds blow west to east at that latitude. San Francisco is east of and very near the Pacific Ocean so the ocean moderates the climate of SF, meaning that it has a maritime climate. Wichita has a continental climate that is not influenced by an ocean. Virginia Beach is near the Atlantic Ocean, which moderates the temperature a bit, but not as much as in SF because the winds are blowing out toward the ocean. }

17.2 World Climates

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. To figure out which climate zone you are in you should
 - a. look at the plants.
 - b. monitor the temperature of the region.
 - c. monitor the precipitation of the region.
 - d. understand the seasons of the region.
2. Small areas with climates that differ from the surrounding area are known as?
 - a. small climates
 - b. micro areas
 - c. microclimates
 - d. abnormalities
3. What percent of Earth is covered by desert?
 - a. 12%
 - b. 26%
 - c. 37%
 - d. 83%
4. Dry climate zones
 - a. have almost no rainfall.
 - b. experience more evaporation than precipitation.
 - c. are all desert biomes.
 - d. all of these.
5. Where it is dark and bitterly cold in winter,
 - a. it is a polar climate.
 - b. the ground is permanently frozen.
 - c. there may be so little precipitation, it is a desert.
 - d. all of these.
6. In the Sonoran Desert,
 - a. there are almost no plants, just shifting sands.
 - b. plants are adapted to long periods of drought.
 - c. all plants go dormant during drought.
 - d. none of these.
7. The Koppen classification system depends on
 - a. temperature

- b. times of year precipitation falls
 - c. amount of precipitation
 - d. all of these
8. Coastal California has a moderate climate because
- a. land breezes warm the winters and sea breezes cool the summers.
 - b. the region receives rain almost year-round.
 - c. mid-latitude storms bring summer and winter rains.
 - d. all of these
9. Continental climates,
- a. have extremely cold winters.
 - b. have an average annual temperature that is fairly mild.
 - c. are not found in the Southern Hemisphere.
 - d. all of these.
10. The humid continental climate
- a. has coniferous trees.
 - b. has long summers and warm winters.
 - c. is found around the polar front.
 - d. all of these
11. There is very little tundra near the South Pole because
- a. the climate is too warm.
 - b. there is little land that is not covered with ice.
 - c. the musk ox and other grazing animals eat it.
 - d. there are too many trees in the region.
12. A small valley could have a different microclimate than the land above it because
- a. the valley is lower in elevation and will be hotter.
 - b. the valley will get less precipitation.
 - c. cold air sinks.
 - d. the air is less dense in the valley.

True or False

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

- _____ 13. Right around the equator is the one latitude with no glaciers.
- _____ 14. The natural vegetation of a region will indicate what type of climate zone it has.
- _____ 15. Tundra plants are small because roots cannot grow deep into the permafrost.
- _____ 16. California experiences drought for about five months each winter.
- _____ 17. The weather of the tropical wet and dry climate is directly influenced by the location of the ITCZ.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A(n) _____ biome contains vast, boreal forests typical of a subpolar climate.
19. Greenland and Antarctica are covered by a(n) _____.
20. The _____ biome contains low bushes and bunch grasses.
21. A zone that is characterized by the living organisms with in it is a(n) _____.
22. Near the equator where part of the year is dry, the vegetation is typically _____.

23. Tropical rainforests have the largest number of species of any biome; they have high _____.
24. The continental polar air mass lies above the _____ climate zone.
25. Ground that is permanently frozen is called _____.

Short Answer

Answer each question in the space provided.

26. What are the features of a Mediterranean Climate as seen in California? How does this affect the vegetation that can grow here?

27. Why do the organisms in a certain climate type share characteristics wherever they are in the world? Discuss arid zone plants as an example.

Answer Key

1. a 2. c 3. a 4. b 5. d 6. b 7. d 8. a 9. d 10. c 11. b 12. c
13. false 14. true 15. true 16. false 17. true
18. taiga 19. ice cap 20. steppe 21. biome 22. savanna 23. biodiversity 24. subpolar 25. permafrost
26. In the summer, a high pressure cell sits over California so the region spends about five months in drought. For vegetation to survive, it must be able to live without water and must protect the water that it has. Coastal California has woody scrubby plants of the chaparral biome.
27. A climate zone has certain characteristics that organisms must be adapted to. So the organisms develop very similar traits to meet the challenges and exploit the advantages of the environment. Plants in arid climates must gather all the water they can, so they have deep or wide roots. They also must store water so they have thick skins or woody outsides. }

17.3 Climate Change

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Between 900 and 1300 A.D.,
 - a. Greenland was colonized by the Vikings
 - b. the Vikings had to leave Greenland
 - c. the Greenland ice cap grew tremendously
 - d. the climate was very much like it is today
2. How much have temperatures risen since the Pleistocene?
 - a. -4°C
 - b. 0°C
 - c. 4°C
 - d. 40°C
3. The 100,000 year climate pattern is known as
 - a. Milankovitch cycles
 - b. sunspot cycles
 - c. global warming
 - d. none of these
4. If the Northern Hemisphere pointed directly at the Sun when Earth is closest to the Sun, compared to now
 - a. summers would be colder and winters would be warmer.
 - b. summers would be warmer and winters would be colder.
 - c. an ice age would begin.
 - d. an ice age would end.
5. Atmospheric greenhouse gas levels
 - a. are currently falling
 - b. are currently stable
 - c. are not being measured
 - d. are currently rising
6. Sunspots
 - a. are magnetic storms on the Sun's surface.
 - b. increase and decrease over a 22-years cycle.
 - c. are responsible for climate variation like the Medieval Warm Period.
 - d. all of these.
7. Burning trees and burning fossil fuels,
 - a. increase the ozone content of the atmosphere

- b. release carbon dioxide into the atmosphere
 - c. create an ozone hole that destroy the ozone layer
 - d. none of these
8. Throughout Earth history
- a. climate has warmed
 - b. when greenhouse gas levels are high, temperatures are high
 - c. greenhouse gas levels and temperature have not been related
 - d. climate has cooled
9. As temperatures warm
- a. species move toward the poles
 - b. species move uphill
 - c. species die out
 - d. all of these
10. In response to global warming,
- a. weather will become hotter everywhere
 - b. there will be less rain and snow everywhere
 - c. weather will become more extreme
 - d. there will be more rain and snow everywhere
11. Scientists cannot predict exactly what will happen to climate in the future because they do not know
- a. the amounts of greenhouse gases that will be emitted
 - b. the way the climate system will respond
 - c. whether people will be able to reduce their emissions
 - d. all of these
12. As oceans become more acidic
- a. they will be able to store more carbon dioxide
 - b. creatures with carbonate shells will be unable to grow
 - c. there will be dead zones near river mouths
 - d. none of these

True or False

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

- _____ 13. Throughout most of Earth history, climate has been cooler than it is today.
- _____ 14. For the past 10,000 years, temperatures have risen slowly, steadily, and without decreasing.
- _____ 15. Global warming will likely result in a loss of biodiversity.
- _____ 16. The variation in sunspot activity is correlated with temperature changes on Earth.
- _____ 17. Glaciers covered much of the planet continually between 1.8 million and 10,000 years ago.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. We currently see short-term climate changes with the _____ cycle.
19. Monitor stations on Mauna Loa volcano in Hawaii were the first to detect a rise in _____.
20. The time period of the ice ages between 1.8 million and 10,000 years ago is known as the _____ Epoch.
21. When glaciers advance, sea level _____.
22. During the time of Pangaea, most of the land area had a(n) _____ climate.

23. People clear tropical rainforests so that they can farm, a process called _____ agriculture.
24. Ozone is a pollutant and a greenhouse gas in the _____ layer, and filters out ultraviolet radiation in the _____ layer.
25. The highest emissions of greenhouse gases per person are from the nation of _____.

Short Answer

Answer each question in the space provided.

26. Why do fish die off of South America during an El Niño?

27. Why are scientists increasingly certain that human activities are leading to warmer global temperatures?

Answer Key

1. a 2. c 3. a 4. b 5. d 6. a 7. b 8. b 9. d 10. c 11. d 12. b
13. false 14. false 15. true 16. false 17. false
18. El Niño or ENSO 19. CO₂ 20. Pleistocene 21. falls 22. continental 23. slash-and-burn 24. troposphere; stratosphere 25. the United States
26. Warm water gathers in the western Pacific until it rises too high and then it spreads back across the equator to the eastern Pacific off of South America. The warm water is buoyant and it shuts down upwelling that is ordinarily common along the west coast of South America. Upwelling of cold nutrient-rich water ordinarily feeds plankton, which form the base of the food chain.
27. As scientists study the climate system, they learn the things that can cause global temperatures to rise. Natural variations are caused by changes in the sun, short-term climate cycles, natural changes in greenhouse gases and other atmospheric gases. These variations all together cannot account for the changes that we are now seeing. }

17.4 Climate

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Climate is the average of weather for a region for at least
 - a. 100 years
 - b. 50 years
 - c. 30 years
 - d. 10 years
2. What is the primary factor that influences the climate of a region?
 - a. wind
 - b. latitude
 - c. rainfall
 - d. sunlight
3. Which type of climate has the greatest temperature differences between day and night and between summer and winter?
 - a. continental
 - b. maritime
 - c. polar
 - d. none of these
4. Which biome consists mostly of grasses, with widely scattered deciduous trees and rare areas of denser forests?
 - a. tropical rainforest
 - b. steppe
 - c. desert
 - d. savanna
5. Which biome do you find where there is extreme cold, little light, little precipitation and small ground-hugging plants?
 - a. subpolar
 - b. ice cap
 - c. steppe
 - d. polar tundra
6. Which of the following is an example of a microclimate?
 - a. a glacier on top of Mt. Kilimanjaro
 - b. San Francisco, which is moderated by the Pacific Ocean
 - c. coastal California, which has a long summer drought
 - d. the massive expanse of the Amazon Rainforest

7. The most recent ice age ended
 - a. 100 years ago
 - b. 1,000 years ago
 - c. 10,000 years ago
 - d. 100,000 years ago
8. Which of the following weather phenomena causes upwelling off of western South America to shut down?
 - a. El Niño
 - b. La Niña
 - c. normal conditions
 - d. none of these
9. What event corresponded to a time when there were no sunspots?
 - a. Medieval Warm Period
 - b. The Little Ice Age
 - c. the Milankovitch Cycle
 - d. none of these
10. Which greenhouse gas is the product of the burning of fossil fuels and forests?
 - a. ozone
 - b. methane
 - c. carbon dioxide
 - d. chlorofluorocarbons

True or False

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

- _____ 11. At the ITCZ is the doldrums, called that because ships there were unable to sail due to the lack of steady winds.
- _____ 12. Climate has changed throughout Earth history.
- _____ 13. The average person in China produces more greenhouse gases than the average US citizen.
- _____ 14. Methane is a greenhouse gas released from raising livestock and producing rice.
- _____ 15. Dry climate zones cover about 50% of the world's land area.
- _____ 16. Rainforests survive a three month drought each dry season.
- _____ 17. The polar regions receive the least solar radiation.
- _____ 18. Atmospheric carbon dioxide levels are rising.
- _____ 19. During Earth history, when greenhouse gas levels were high, temperatures were high.
- _____ 20. Average global temperature is rising at an increasing rate.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. _____ is the average weather in a location over about 30 years.
22. The _____ moves north in the summer, bringing warm equatorial weather with it.
23. A _____ climate is strongly influenced by the nearby sea.
24. _____ are dominated by densely packed, broadleaf evergreen trees and extreme biodiversity.
25. The scrubby, woody vegetation that thrives in the Mediterranean climate is called a _____.
26. In the Northern Hemisphere, the largest changes in climate are being seen in the _____.

27. The high _____ in the polar regions is because of the ice and snow, which reflects a large amount of the sun's light.
28. The _____ are created by the bases of the Hadley, Ferrell, and Polar cells.
29. A climate type and its plants and animals make up a _____.
30. As glaciers melt and ocean water expands as it warms, sea level _____.

Short Answer

Answer each question in the space provided.

31. Why are the same types of organisms found at similar latitudes and in similar positions on nearly all continents in both the Northern and Southern Hemispheres (with one exception)?

32. How are climate zones classified?

33. What can cause long term climate change?

Answer Key

1. c 2. b 3. a 4. d 5. d 6. a 7. c 8. a 9. b 10. c

11. true 12. true 13. false 14. true 15. false 16. true 17. true 18. false 19. true 20. true

21. Climate 22. Intertropical Convergence Zone (ITCZ) 23. maritime 24. Tropical rainforests 25. chaparral 26. Arctic 27. albedo 28. prevailing winds 29. biome 30. is rising

31. The conditions that create the climate zones are similar at similar positions on the continents. Organisms must adapt to those conditions. There are only so many ways that an organism can live under those circumstances. These are the adaptations.

32. Climate zones are classified by the Koppen classification system which is based on the temperature, amount of precipitation, and the time of year when precipitation occurs.

33. Possible answers:

- The amount of energy the Sun produces over years.
- The positions of the continents over millions of years.
- The tilt of Earth's axis and orbit over thousands of years.
- Sudden and dramatic because of random catastrophic events, such as a large asteroid impact.
- Greenhouse gases in the atmosphere, caused naturally or by human activities. }

CHAPTER

18**HS Ecosystems and Human Populations Assessments****Chapter Outline**

- 18.1 ECOSYSTEMS**
 - 18.2 THE CARBON CYCLE AND THE NITROGEN CYCLE**
 - 18.3 HUMAN POPULATIONS**
 - 18.4 ECOSYSTEMS AND HUMAN POPULATIONS**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

18.1 Ecosystems

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. All living creatures and non living things that interact within an area make up which of the following?
 - a. population
 - b. habitat
 - c. community
 - d. ecosystem
2. Energy in an ecosystem flows in how many directions?
 - a. 1
 - b. 2
 - c. 4
 - d. many
3. Herbivores are which type of consumer?
 - a. Producer
 - b. Primary consumer
 - c. Secondary consumer
 - d. Tertiary consumer
4. In which type of relationship does one organism benefit and the other is not harmed?
 - a. Commensalism
 - b. Parasitism
 - c. Mutualism
 - d. None of the above
5. Matter in an ecosystem flows in how many directions?
 - a. 1
 - b. 2
 - c. 5
 - d. many
6. Which of the following is NOT a habitat?
 - a. A hole in a cactus
 - b. Under a leaf in a forest
 - c. Within the intestines of a shark
 - d. All of the above are habitats
7. Which of the following would be highest on the food pyramid?
 - a. Phytoplankton

- b. Snakes
 - c. Falcons
 - d. Mice
8. Which type of consumer eats both plants and animals?
- a. omnivore
 - b. herbivore
 - c. carnivore
 - d. insectivore
9. Nutrients are useful for
- a. growing an organism's body
 - b. building shells or bones
 - c. creating proteins, fats, carbohydrates and nucleic acids
 - d. all of these
10. When one organism eats another organism, it
- a. receives all of its nutrients.
 - b. receives all of its energy.
 - c. receives all of its energy and nutrients.
 - d. none of these
11. Parasites usually
- a. kill their hosts fairly rapidly.
 - b. do not kill their hosts.
 - c. kill their hosts over a long period of time.
 - d. none of these.
12. Organisms that break dead tissue down into nutrients are
- a. producers
 - b. consumers
 - c. decomposers
 - d. scavengers

True or False

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

- _____ 13. Climate conditions determine the ecosystem that is found at a location.
- _____ 14. Every ecosystem has the same general roles that living creatures fill.
- _____ 15. Plants living in different regions in the same type of climate have similar adaptations.
- _____ 16. A community is all of the species and abiotic factors that coexist within a specific area.
- _____ 17. Humans are top consumers.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. An animal that only eats meat is a _____.
19. A _____ enjoys a relationship that the organisms finds beneficial, but is harmful to its host.
20. An organism that consumes both producers and other consumers for food is called a(n) _____.
21. Mice are common _____ for birds.
22. Wind is a(n) _____ part of an ecosystem.

23. A(n) _____ is a combination of all the populations living in an ecosystem.
24. Feeding relationships across multiple trophic levels are displayed on a(n) _____.
25. _____ for resources and mates can be seen in every aspect of an ecosystem.

Short Answer

Answer each question in the space provided.

26. What would happen to life on Earth if there were no decomposers?

27. What are the original sources of nutrients? How do nutrients enter and leave an ecosystem?

Answer Key

1. d 2. a 3. b 4. a 5. d 6. d 7. c 8. a 9. d 10. a 11. b 12.
13. true 14. true 15. true 16. false 17. true
18. carnivore 19. parasite 20. omnivore 21. prey 22. abiotic 23. community 24. food web 25. Competition
26. Decomposers break down dead organisms and their waste materials into nutrients and carbon dioxide. The nutrients and gases can be used by new living things. Without decomposers, there would be no way for nutrients to be recycled and life on Earth would have died out a long time ago.
27. Nutrients are ions that come from broken down rocks and minerals. They enter the soil and can be taken up by plants. When one organism eats another, its nutrients are transferred. }

18.2 The Carbon Cycle and the Nitrogen Cycle

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

- Areas in ecosystems that produce more carbon than they require are known as
 - carbon sink
 - carbon neutral
 - carbon source
 - carbon bank
- What happens during respiration?
 - CO₂ is converted into O₂.
 - O₂ and sunlight are converted into CO₂ and sugar.
 - CO₂ and water create solar energy and O₂.
 - O₂ is used to burn sugar to create food energy.
- Nitrogen is an essential component for which of the following?
 - amino acids
 - nucleic acids
 - chlorophyll
 - all of the above
- The amount of time that carbon stays in a reservoir is known as
 - residence time
 - source time
 - reservoir time
 - sink time
- With nitrogen fixing, nitrifying bacteria
 - oxidize ammonia to create nitrates; other bacteria create nitrites from nitrates.
 - oxidize ammonia to create nitrites; other bacteria create nitrates from nitrites.
 - nitrify ammonia to create nitrates; other bacteria create nitrites from nitrates.
 - nitrify ammonia to create nitrites; other bacteria create nitrates from nitrites.
- About what is the current carbon dioxide concentration as measured at Mauna Loa, Hawaii?
 - 200 ppmv
 - 400 ppmv
 - 800 ppmv
 - 1,000 ppmv
- What is the second largest source of atmospheric CO₂?
 - automobiles

- b. deforestation
 - c. cow flatulence
 - d. industrial pollution
8. When propane burns,
- a. it uses carbon dioxide and produces oxygen and water
 - b. it uses carbon dioxide and oxygen and produces water
 - c. it uses oxygen and produces carbon dioxide and water
 - d. it uses carbon dioxide, oxygen and water
9. When did atmospheric CO₂ begin to increase?
- a. when people started to use fire
 - b. when the ozone layer began to develop a hole
 - c. at the beginning of the Industrial Revolution
 - d. at the start of the Green Revolution
10. Scientists can determine past atmospheric CO₂ levels from
- a. measuring the composition of air bubbles trapped in glacial ice.
 - b. checking human records from pre-industrial times.
 - c. analyzing gas contents in igneous rocks.
 - d. all of these.
11. Greenhouse gases
- a. absorb incoming solar radiation in the atmosphere.
 - b. trap infrared radiation radiating from Earth's surface.
 - c. scatter sunlight from one molecule to another.
 - d. All of these.
12. What happens to incoming solar radiation?
- a. A small amount is absorbed by Earth's surface.
 - b. Some is re-radiated as heat and passes into space.
 - c. A small amount passes through the atmosphere.
 - d. All of these.

True or False

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

- _____ 13. Plants create energy from sunlight.
- _____ 14. When an organism decomposes, its carbon is released back into the environment.
- _____ 15. Carbon cycles through organisms and into the environment.
- _____ 16. Protein, carbohydrates, and fats are all part of the body and all contain carbon
- _____ 17. The energy from sunlight and water are necessary components for turning carbon into inorganic carbon through photosynthesis.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Many countries and organizations have been fighting the _____ of the Amazon rainforest.
19. Photosynthesis transforms _____ carbon into _____ carbon.
20. A forest is a carbon _____. If that forest burns it is a carbon _____.
21. Carbon dioxide is a _____ gas in the atmosphere.

22. _____ is/are the greatest source of carbon dioxide in the atmosphere.
23. The average CO₂ in December 2012 was 394 ppm. The average for 1958 was 316 ppm. Atmospheric CO₂ has risen _____ ppm in _____ years.
24. In photosynthesis, CO₂ is converted to _____. In respiration, _____ is converted to CO₂,
25. Bacteria fix nitrogen for a plant and when the plant dies it fertilizes the soil. This relationship is _____.

Short Answer

Answer each question in the space provided.

26. How does burning fossil fuels cause average global temperature to increase?

27. What happens when excess nitrogen enters a pond or lake?

Answer Key

1. c 2. d 3. d 4. a 5. b 6. b 7. b 8. c 9. c 10. a 11. a 12. b
13. false 14. true 15. true 16. true 17. false
18. deforestation 19. inorganic; organic 20. sink; source 21. greenhouse 22. fossil fuels 23. 78; 54 24. O₂; O₂ 25. symbiotic
26. Fossil fuels are ancient plants that store CO₂ when they are underground. When the fossil fuels are burned, the CO₂ enters the atmosphere. CO₂ is a greenhouse gas and it traps heat. When CO₂ levels increase, the atmosphere can trap more heat.
27. The nitrogen fertilizes the pond and so bacteria grow. When the bacteria die, they decompose, which uses oxygen. Without oxygen, fish and other aquatic organisms can't live. }

18.3 Human Populations

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

- Carrying capacity is achieved when what occurs?
 - the number of births equal the number of deaths
 - the number of births exceeds the number of deaths
 - the number of deaths exceed the number of births
 - the number of deaths falls below 10,000
- Currently how much of ice-free land has been converted to human use?
 - 20%
 - 33%
 - 50%
 - 76%
- If a limiting factor for a species increases, what happens to the carrying capacity?
 - the carrying capacity increases
 - the carrying capacity does not rely on the limiting factor
 - the carrying capacity decreases
 - the carrying capacity doubles
- Species that introduced to new habitats by humans are known as
 - invasive species
 - infestation
 - inept species
 - population merging
- The Green Revolution refers to what?
 - improved energy efficiency
 - improved agricultural productivity
 - improved oil production
 - improved color pigmentation
- The human population in 2013 is estimated to be
 - 10 billion
 - 7 billion
 - 5 billion
 - 2 billion
- What are the goals of sustainable development?
 - help people out of poverty

- b. protect the environment
 - c. use resources no faster than the rate they are regenerated.
 - d. all of the above
8. What is true about the beginning of the Industrial Revolution?
- a. mass production
 - b. widespread use of fossil fuels
 - c. late 1700s
 - d. all of these
9. A century ago a farmer produced enough food for _____ people. Now a farmer can feed more than _____ people.
- a. 1; 10
 - b. 2.5; 130
 - c. 4; 100
 - d. 8; 50
10. How many times more resources do people in developed nations use than people in undeveloped nations?
- a. they use the same amount
 - b. double
 - c. 10
 - d. 32
11. An example of a damaging species that lives in a new environment and has no predators to stop it is
- a. California Condors in Northern Arizona.
 - b. Mexican Gray Wolves in Southern Arizona.
 - c. Australian Brown Tree Snake in Guam.
 - d. Mule deer in Northwestern Colorado.
12. To better develop sustainably, people can
- a. use more pesticides to further the goals of the Green Revolution.
 - b. use more fossil fuels to improve transportation and manufacturing.
 - c. purchase products that are produced sustainably.
 - d. all of these.

True or False

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

- _____ 13. In a hunter-gatherer society, people relied on the resources they could find where they lived.
- _____ 14. Every major advance in agriculture has allowed global population to increase.
- _____ 15. The Green Revolution reduced the use of water because it is more efficient.
- _____ 16. The natural carrying capacity of Earth for humans is at least equal to the human population of Earth today.
- _____ 17. A limiting factor determines the carrying capacity for a species.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A species of organisms introduced into a new environment by humans either purposefully or by accident is a(n) _____.
19. In 1979 China enacted a one-child policy over fears of _____.
20. The ability to produce automobiles en masse during the _____ caused fossil fuels to grow rapidly.

21. _____ can kill pests that might harm crops, over recent years the practice has risen health concerns in humans.
22. The rate of growth of the human population is very likely to _____ in the coming decades.
23. Humans have caused the extinction rate of wild species to increase at least _____ times the normal rate.
24. About 1.2 billion people on Earth do not have access to _____ water.
25. In developed nations, resources are overused and pollution is generated due to _____.

Short Answer

Answer each question in the space provided.

26. How could the carrying capacity of an area increase? Give an example.
27. How did the Green Revolution change the carrying capacity of Earth for humans? Is there a reason this could be a problem?

Answer Key

1. a 2. c 3. a 4. a 5. b 6. b 7. d 8. d 9. b 10. d 11. c 12. c
13. true 14. true 15. false 16. false 17. true
18. invasive species 19. overpopulation 20. Industrial Revolution 21. Pesticide 22. decrease 23. 100 24. clean 25. over-consumption
26. If a limiting factor is changed or eliminated, the carrying capacity for a species might increase. For example, if a plant species likes soggy ground and there is a drought, the limiting factor is soggy ground and the plant species will reduce in number and distribution.
27. The Green Revolution increased agricultural productivity so more people could survive. To produce more food, water is being used in unsustainable ways. Also, chemicals are important and some of them may turn out to be dangerous to people or to other organisms. }

18.4 Ecosystems and Human Populations

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

- All of the individuals of a single species that occur together at a given place and time are members of the same
 - community
 - population
 - ecosystem
 - niche
- Which of the following is an abiotic factor?
 - bacteria
 - plants
 - light
 - fungi
- Both species benefit in which type of relationship?
 - Commensalism
 - Parasitism
 - Mutualism
 - None of the above
- Nutrients and carbon dioxide are the result of tissue breakdown by
 - herbivores
 - carnivores
 - omnivores
 - decomposers
- If a population is limited by water and nutrients, the population will
 - increase if there is an increase in rainfall.
 - increase if there is an increase in food.
 - decrease if there is an increase in rainfall or food.
 - none of these.
- What percent of energy is passed from organisms of one tropic level to the next?
 - 5%
 - 10%
 - 15%
 - 20%
- Which of the following is the chemical reaction for respiration?
 - $C + O_2 \rightarrow CO_2$

- b. $C + 2H_2 \rightarrow CH_4$
- c. $6CO_2 + 6H_2O + \text{energy} \rightarrow C_6H_{12}O_6 + 6O_2$
- d. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + \text{energy}$

8. What is the largest source of carbon dioxide in the atmosphere?

- a. burning fossil fuel
- b. deforestation
- c. respiration
- d. none of these

9. Top predators are scarce because

- a. they are large and take up a lot of space.
- b. they are a favorite food of many organisms.
- c. energy is lost at each trophic level.
- d. none of these.

10. When greenhouse gases in the atmosphere increase, the

- a. atmosphere warms.
- b. atmosphere cools.
- c. temperature of the atmosphere stays the same.
- d. effect is not yet known.

True or False

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

- _____ 11. Energy moves through an ecosystem in many directions.
- _____ 12. In commensalism, both species benefit.
- _____ 13. Forests and oceans are carbon sinks.
- _____ 14. Global warming is a consequence of increased carbon dioxide and other greenhouse gases in the atmosphere.
- _____ 15. The carrying capacity can change if more resources become available.
- _____ 16. Current world human population is less than 5 billion.
- _____ 17. Groundwater is replaced as rapidly as it is lost.
- _____ 18. Wild fish are being over harvested.
- _____ 19. One of the most important steps to achieving a more sustainable future is to reduce human population.
- _____ 20. Overpopulation will occur so far in the future that we do not need to worry about it.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

- 21. An _____ is made up of living creatures and the nonliving things that those creatures need within an area.
- 22. A _____ is a single type of organism that can interbreed and produce fertile offspring.
- 23. If food energy passes from grass to a goat, it has passed from one _____ to another.
- 24. A producer that is eaten by a grazing herbivore fills the same _____ as an organism that does the same things in a different location.
- 25. Ions that are crucial to living things and that pass between them are called _____.
- 26. _____ are organisms that are introduced into a habitat where they do not belong.

27. Currently, about _____ of the world's fresh water is used for agriculture.
28. A _____ determines the carrying capacity for a species.
29. If you eat a quiche made of spinach, mushrooms, eggs and chicken, you are a(n)_____.
30. For nitrogen in the atmosphere to be useful to organisms it must be _____.

Short Answer

Answer each question in the space provided.

31. What does it mean to say that each ecosystem has the same niches, but the same species don't always fill them?

32. How did the Green Revolution change the carrying capacity of the Earth?

33. What is the purpose of sustainable development?

Answer Key

1. b 2. c 3. c 4. d 5. d 6. b 7. d 8. a 9. c 10. a

11. false 12. false 13. true 14. true 15. true 16. false 17. false 18. true 19. true 20. false

21. ecosystem 22. species 23. trophic level 24. niche 25. nutrients 26. Invasive species 27. 70% 28. limiting factor
29. omnivore 30. fixed

31. Each climate type creates a biome. Each biome has certain roles within it. If two organisms live in different locations but within the same biome and have the same role, they will have very similar adaptations. For example, if a plant lives in a desert, it will have adaptations that keep it from losing water and so it will resemble other desert plants in different locations. The species that fills a role evolved in that region.

32. Improved agricultural productivity by:

- Improved crops by selecting the traits to promote productivity.
- Genetically engineered crops were introduced.
- Increased the use of artificial fertilizers and chemical pesticides.
- Agricultural machinery.
- Increasing access to water.

33. Help people out of poverty, protect the environment, and use resources no faster than the rate at which they regenerated. }

CHAPTER 19 HS Human Actions and the Land Assessments

Chapter Outline

- 19.1 LOSS OF SOILS
 - 19.2 POLLUTION OF THE LAND
 - 19.3 HUMAN ACTIONS AND THE LAND
-

- The answer keys can be found in the Resource tab above the Table of Contents.

19.1 Loss of Soils

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. How do trees prevent soil erosion?
 - a. Trees keep the wind from blowing hard through an area.
 - b. The leaves keep rain from striking the ground hard
 - c. Roots of the trees hold the soil together
 - d. All of the above
2. The Dust Bowl occurred in what time period?
 - a. 1830s
 - b. 1870s
 - c. 1910s
 - d. 1930s
3. What area of the United States was affected by the Dust Bowl?
 - a. Northeast
 - b. South
 - c. Midwest
 - d. West
4. Which activity likely accelerates soil erosion the most?
 - a. recreational activities
 - b. farming
 - c. construction
 - d. logging
5. Soil erosion
 - a. is a natural process and as such should be left alone.
 - b. has been accelerated by human activities.
 - c. is an aesthetic problem but does not real damage to human society.
 - d. none of these
6. Which of the following is an agent of soil erosion?
 - a. water
 - b. wind
 - c. gravity
 - d. all of the above
7. One reason that we there is unlikely to be another Dust Bowl in the Midwestern U.S. any time soon is
 - a. irrigation from the Ogallala Aquifer.

- b. the planting of erosion-resistant crops.
 - c. concrete barriers around fields protect them from wind.
 - d. all of these.
8. Farming causes soil erosion because
- a. the land is uncovered by plants for part of the year.
 - b. farm machines churn up the soil.
 - c. crop plants are often less able to protect the land than native plants.
 - d. all of these.
9. Old mines are made to cause less soil erosion when
- a. they are kept wet all the time
 - b. trees are planted over them
 - c. they are covered with concrete
 - d. none of these
10. How much topsoil has eroded away since the arrival of Europeans in the United States?
- a. very little
 - b. one-tenth
 - c. one-third
 - d. one-half
11. To reduce soil erosion from agriculture
- a. plant tall trees around the field to protect from wind.
 - b. use large sprinklers to be sure the soil is always moist.
 - c. plant one type of crop in a large region to keep conditions the same.
 - d. all of these.
12. To reduce soil erosion from logging
- a. clear cut an entire area.
 - b. log mostly on steep lands.
 - c. cut a small area and replant the logged area with new seedlings.
 - d. all of these.

True or False

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

- _____ 13. Soil is an important natural resource.
- _____ 14. The Dust Bowl was caused entirely by bad farming practices.
- _____ 15. Off road vehicles cause soil erosion, but hiking, even off trail, does not.
- _____ 16. Grazing animals are beneficial to soil as they compact the soil under their hooves.
- _____ 17. Soil eroded from logging can bury coral reefs.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The classic novel, *The Grapes of Wrath*, by _____ explores the lives of a family during the Dust Bowl.
19. Before agriculture came to the Great Plains the dominant plants were _____.
20. The soil that is most likely to erode is the nutrient-rich _____.
21. _____ agriculture clears tropical rainforests and leaves land open for erosion.
22. _____ animals cause soil erosion because they churn up ground with their hooves.

23. Besides removing trees, logging removes _____, the dead leaves, that protect forest floors from erosion.
24. Near a parking lot, _____ runs off the surface and causes erosion nearby.
25. " _____ spaces" in cities, such as parks, help to prevent soil erosion.

Short Answer

Answer each question in the space provided.

26. What led up to the conditions that caused the Dust Bowl?

27. What can be done to minimize the amount of soil erosion caused by grazing animals?

Answer Key

1. d 2. d 3. c 4. b 5. b 6. d 7. a 8. d 9. b 10. c 11. a 12. c
13. true 14. false 15. false 16. false 17. true
18. John Steinbeck 19. grasses 20. topsoil 21. slash-and-burn 22. grazing 23. leaf litter 24. water 25. green
26. The region is not good farmland. The natural plants are grasses and there is not a lot of rain. A wet period leading up to the 1930s and the need to feed the troops in WWI led to the region being converted to farmland, initially unsuccessfully. People made a lot of money so more farms were created.
27. Move the animals during the year so that they do not consume all of the vegetation in one spot. Keep the animals away from stream banks, which are especially prone to erosion. }

19.2 Pollution of the Land

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Hazardous waster includes substances that are:
 - a. toxic
 - b. corrosive
 - c. flammable
 - d. all of the above
2. How many children die from lead poisoning each year in the U.S.?
 - a. 10
 - b. 200
 - c. 500
 - d. 10000
3. In what year was the Superfund Act passed?
 - a. 1964
 - b. 1977
 - c. 1980
 - d. 1999
4. At Love Canal
 - a. the hazardous wastes were safely buried.
 - b. people became sick right after the town was built.
 - c. the first sign that something was wrong was that children developed cancer.
 - d. none of these
5. Where are Superfund sites located?
 - a. in densely populated areas
 - b. spread across the U.S.A.
 - c. East of the Mississippi River
 - d. all around the world
6. Which of the following is NOT considered a potentially hazardous material?
 - a. baking soda
 - b. batteries
 - c. fertilizers
 - d. paint
7. At Love Canal
 - a. the problem was uncovered by local residents

- b. the local government detected the problem and dealt with it.
 - c. the state government detected the problem and dealt with it.
 - d. the federal government detected the problem and dealt with it.
8. Nations that produce the most hazardous waste
- a. have the most people.
 - b. have the most industry.
 - c. have the most farmers.
 - d. have the most buildings.
9. Besides cancer, toxic wastes can cause
- a. miscarriages in pregnant women.
 - b. birth defects.
 - c. sickness in children.
 - d. all of these.
10. One way to find toxic waste contamination is to identify
- a. a cancer cluster.
 - b. a person with a certain type of cancer
 - c. an entire population exhibiting flu-like symptoms.
 - d. none of these.
11. China creates a lot of hazardous waste because
- a. they have the world's largest population.
 - b. they are big over-consumers.
 - c. they produce an incredible number of products for developed nations.
 - d. none of these.
12. The Resource Conservation and Recovery Act of 1976 requires that companies
- a. recycle all the materials they produce.
 - b. show the government that they've disposed of wastes properly.
 - c. use only recycled materials to produce their products.
 - d. all of these.

True or False

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

- _____ 13. The Superfund Act has had little effect on the behavior of companies regarding toxic wastes.
- _____ 14. If a location is considered a Superfund site, it has been heavily polluted.
- _____ 15. The Superfund Act requires companies to be responsible for hazardous chemicals that they put into the environment and to pay to clean up polluted sites.
- _____ 16. Pesticides in any amount are not toxic to humans.
- _____ 17. Toxic wastes can be located because they are always visible.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A law passed by the U.S. Congress in 1980 that held companies responsible for any hazardous chemicals that they might create is called a(n) _____.
19. A substance that can cause serious harm, including death, or is poisonous is _____.
20. A substance that causes dangerous chemical reactions is _____.

21. People use _____ to kill unwanted insects.
22. The people most likely to sicken first from exposure to hazardous wastes are _____.
23. The toxic metal _____ damages the brain and nervous system.
24. The toxic metal _____ was formerly put into paint and gasoline.
25. A good, non-toxic cleanser that just about everyone has in their kitchen is _____.

Short Answer

Answer each question in the space provided.

26. What does the Superfund Act say?

27. Sometimes substances, such as pesticides, are used and released into the environment without much testing. Later they may be found to be toxic. Is there a potential problem with this?

Answer Key

1. d 2. b 3. c 4. d 5. b 6. a 7. a 8. b 9. d 10. a 11. c 12. b
13. false 14. true 15. true 16. false 17. false
18. Superfund Act 19. toxic 20. chemically active 21. pesticides 22. children 23. mercury 24. lead 25. vinegar
26. The Superfund Act requires that companies clean up contaminated Superfund sites. If the responsible party cannot be identified or cannot clean up a site, the federal government will pay for cleanup out of a trust fund.
27. It is very difficult to make a substance harmless once it is in the environment than it is to keep it from getting into the environment in the first place. The process seems backwards. }

19.3 Human Actions and the Land

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What occurred in the 1930s due in part to the poor farming practices?
 - a. the Great Depression
 - b. the Dust Bowl
 - c. World War I
 - d. World War II
2. What was Love Canal, New York?
 - a. a river
 - b. an abandoned waterway
 - c. a town
 - d. none of these
3. What did the Superfund Act of 1980 require businesses to do?
 - a. inform homeowners of risk from chemicals
 - b. sell polluted land to the government
 - c. pay to clean up the pollution they created
 - d. pay extra taxes if they polluted
4. Lead poisoning
 - a. causes cancer
 - b. causes a person to be "mad as a hatter"
 - c. is common in people who eat a lot of tuna
 - d. may affect young children in homes with old paint
5. Sources of mercury include all of the following except...
 - a. anti-knock gasoline
 - b. volcanic eruption
 - c. burning coal
 - d. electronic appliances
6. Which country produces the most hazardous wastes?
 - a. China
 - b. South Africa
 - c. United States
 - d. Russia
7. How are contaminated sites usually identified?
 - a. the company notifies the EPA

- b. people start getting sick
 - c. the EPA randomly tests areas
 - d. animals show up with mutations
8. To avoid soil erosion
- a. contour hillsides that are to be farmed.
 - b. clear forests to make the landscape all the same.
 - c. introduce worms and other small creatures to the soil.
 - d. none of these.
9. Which of the following recreational activities can accelerate soil erosion?
- a. hiking
 - b. off road trails for ATVs
 - c. camping
 - d. all of the above
10. Which source of erosion is the most destructive?
- a. agriculture
 - b. logging
 - c. mining
 - d. construction

True or False

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

- _____ 11. Logging results in the loss of leaf litter, which protects forest soils from erosion.
- _____ 12. Soil erosion is a natural process that has been greatly accelerated by human activities.
- _____ 13. The Dust Bowl occurred when farming practices changed for the worse.
- _____ 14. Many practices can be adopted to prevent soil erosion.
- _____ 15. Surface mining disturbs the land but doesn't contribute to soil erosion.
- _____ 16. Fine soil is blown away by wind.
- _____ 17. Soil erosion can be reduced in cities by keeping as much "green space" as possible.
- _____ 18. The part of soil that is the most important natural resource is caliche.
- _____ 19. A Love Canal resident was indirectly responsible for passage of the Superfund Act.
- _____ 20. If a company cannot pay to clean a Superfund Site, the taxpayers foot the bill.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. If too many animals are living in the area, the land may become _____.
22. Farmland is especially vulnerable to erosion in winter when the land lies _____.
23. Using _____ to water just the area where a plant is can prevent soil erosion.
24. Topsoil blew in huge storms during the _____.
25. Love Canal became a _____ site in 1983.
26. A _____ material causes serious harm, death, or is poisonous.
27. A _____ material destroys other things with chemical reactions.

28. Something is _____ if it causes dangerous or unwanted chemical reactions, such as an explosion.
29. Anything that catches fire easily and may send dangerous smoke into the air is called _____ - _____.
30. The Resources Conservation and Recovery Act of 1976 requires that companies keep track of the _____ - materials they produce.

Short Answer

Answer each question in the space provided.

31. What can cause soil erosion?
32. What can you do to reduce soil erosion during your recreational activities?
33. Briefly describe the four types of hazardous waste.

Answer Key

1. b 2. b 3. c 4. d 5. a 6. c 7. b 8. a 9. d 10. a

11. true 12. true 13. false 14. true 15. false 16. true 17. true 18. true 19. false 20. true

21. overgrazed 22. fallow 23. drip irrigation 24. Dust Bowl 25. Superfund 26. toxic 27. corrosive 28. chemically active 29. flammable 30. hazardous

31. Farming (agriculture), grazing, logging and mining, construction, recreational activities.

32. Avoid using off-road vehicles, especially on hills or stream banks. Stay on designated trails when hiking or mountain biking.

33. Toxic waste is poisonous and causes serious harm or death. Chemically active waste causes dangerous chemical reactions. Corrosive wastes destroys things by chemical reactions. Flammable waste catches fire easily. }

CHAPTER

20**HS Human Actions and
Earth's Resources Assessments****Chapter Outline**

- 20.1 USE AND CONSERVATION OF RESOURCES**
 - 20.2 ENERGY CONSERVATION**
 - 20.3 HUMAN ACTIONS AND EARTH'S RESOURCES**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

20.1 Use and Conservation of Resources

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. How many pounds of minerals are used per person in the U.S.A. per year?
 - a. 4,000 lbs
 - b. 23,000 lbs
 - c. 40,000 lbs
 - d. 120,000 lbs
2. Nations with an abundance of a resource usually do what with it?
 - a. import more resources
 - b. export excess resources
 - c. trade for more of the same resource
 - d. bury it back into Earth
3. The top 11 oil producing countries produce what percent of the world's oil?
 - a. 50%
 - b. 60%
 - c. 70%
 - d. 80%
4. When Country A needs a resource and Country B has it
 - a. Country B will import it.
 - b. Country A will export it.
 - c. Country B will try to conserve it.
 - d. they could go to war over it.
5. Where is much of the electronic waste sent?
 - a. developing countries
 - b. Canada
 - c. dumped in the Pacific Ocean
 - d. used in construction of buildings
6. Which of the following is a renewable resource?
 - a. oil
 - b. natural gas
 - c. forests
 - d. coal
7. In the section on Monongahela National Forest, magnesium and calcium are
 - a. non-renewable resources

- b. renewable resources
 - c. limiting factors
 - d. none of these
8. Natural resources
- a. can become unusable if they become polluted.
 - b. are useful as long as they are not used up.
 - c. are most valuable if they are renewable.
 - d. none of these.
9. If a forest is logged,
- a. trees can be planted and so the forest is renewable.
 - b. trees can be planted, but a forest takes time to be renewed.
 - c. it can never be the same as it was.
 - d. none of these.
10. Fish reproduce, yet they can be a non-renewable resource if
- a. they become tainted with mercury.
 - b. so many are taken that the population cannot rebound.
 - c. they are no longer desired as a food source.
 - d. none of these.
11. Per capita natural resource use is _____ in developing countries because _____.
- a. lower; poorer people cannot afford as many products
 - b. higher; there are more people in these countries
 - c. lower; they do not want to have the same lifestyle developed nations have
 - d. higher; rich people in developing countries use more resources than anyone
12. Many of the goods people in wealthier nations use are produced in developing nations because
- a. labor costs are lower
 - b. environmental regulations are less stringent
 - c. it is less expensive to ship goods than to make them in the developed nations
 - d. all of these

True or False

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

- _____ 13. Drinking bottled water is better for you and the environment.
- _____ 14. It is usually better to throw something away than to fix it.
- _____ 15. Pollution occurs when a product is produced and when it is tossed away.
- _____ 16. All natural resources are divided into renewable and non-renewable.
- _____ 17. Soil is considered a non-renewable resource.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Oil is the major _____ out of the Saudi Arabia.
19. The developed nations _____ most of their oil from other nations.
20. When people use resources far out of proportion with other people, they are engaging in _____
21. To maintain our lifestyle, we must develop _____ to non-renewable resources.
22. Fresh water can be made from seawater by the process of _____.

23. To make natural resources last longer we must _____ them.
24. A resource that is regenerated many times more slowly than it is used is a _____ resources.
25. A good way to conserve resources is to reduce, reuse and _____.

Short Answer

Answer each question in the space provided.

26. What determines the value of a resource?

27. Why should you conserve natural resources by buying less stuff?

Answer Key

1. c 2. b 3. d 4. d 5. a 6. c 7. c 8. a 9. b 10. b 11. a 12. d
13. false 14. false 15. true 16. true 17. false
18. export 19. import 20. over-consumption 21. alternatives 22. desalination 23. conserve 24. non-renewable 25. recycle
26. The value of a resource is determined by how much of it there is, where it is located relative to where it is used, how easy it is to locate and extract, and how much it costs to extract it and make it usable.
27. Material goods use natural resources and energy resources to produce. So if you buy an item, it represents the use of natural resources. Lots of items that we buy are used very little so it's important to try to conserve by buying less.}

20.2 Energy Conservation

Lesson Quiz

Name_____ Class_____ Date_____

Multiple Choice

Circle the letter of the correct choice.

1. If it takes 3 units of energy to get 18 units of energy, what is the net energy?
 - a. 21 units of energy
 - b. 18 units of energy
 - c. 15 units of energy
 - d. 3 units of energy
2. If you were to replace a incandescent 240V light bulb with a compact fluorescent light at 1,000 lm, how much energy would be saved?
 - a. 30 W
 - b. 40 W
 - c. 70 W
 - d. 130 W
3. Saving energy in industry is
 - a. not possible, since little energy is used.
 - b. possible if equipment is designed to be efficient.
 - c. possible if new materials are used.
 - d. none of these.
4. The amount of usable energy available from a resource after subtracting the amount of energy needed to make the energy is known as
 - a. sum energy
 - b. net energy
 - c. gross energy
 - d. energy
5. What are some ways residential areas can use less energy?
 - a. Turn off lights when not in use.
 - b. Only run appliances when necessary.
 - c. Use a fan instead of an air conditioner.
 - d. All of the above.
6. What does it mean if the net energy is less than zero?
 - a. the system is very efficient
 - b. the system is energy neutral
 - c. it takes more energy to get the energy then what is produced by the resource.
 - d. the resource is renewable

7. What person of the energy use in the United States is used for transportation?
 - a. 14%
 - b. 33%
 - c. 45%
 - d. 67%
8. Which of the following have the highest Net-energy ratio
 - a. solar energy
 - b. natural gas
 - c. petroleum
 - d. coal
9. The cost of an energy source depends on
 - a. the cost of equipment needed to harness it.
 - b. the cost of transporting it.
 - c. its energy efficiency.
 - d. all of these.
10. The amount of energy contained in a resource and the amount of energy needed to get that energy is the _____ of that resource.
 - a. net-energy ratio
 - b. net energy
 - c. energy efficiency
 - d. none of these.
11. About the economics of conserving energy:
 - a. It is expensive because you have to buy special equipment.
 - b. It reduces costs because you use less energy.
 - c. It reduces costs because you create energy from less expensive sources.
 - d. All of these
12. If the cost of oil goes up,
 - a. the energy efficiency of oil goes up.
 - b. the net energy of oil goes up.
 - c. some sources of oil that were not economical might become economical.
 - d. none of these.

True or False

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

- _____ 13. Solar energy is the least expensive type of electricity available.
- _____ 14. To increase energy efficiency, be sure that equipment is running well.
- _____ 15. Filling you car's very low tires could make the vehicle use less gas.
- _____ 16. The best energy source would be one that supplies a lot of energy and takes a lot of energy to make it useable.
- _____ 17. Individuals can only do a little to increase energy efficiency because most energy is used by industry.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The more efficient an energy source is the more useful _____ it will produce.
19. Energy cannot be _____ and it cannot be _____.

20. As energy transfers forms, some is always lost as _____
21. The amount of energy that is left after all the energy that is needed to make it useful is subtracted is known as _____
22. Transportation by cars and airplanes is _____ energy efficient than transportation by boats and trains.
23. _____ bulbs are much more energy efficient than incandescent bulbs for lighting.
24. Like homes, industries should _____, reuse and recycle materials.
25. In a home or business, you can set a(n) _____ to turn off heat or air conditioning when it is not needed.

Short Answer

Answer each question in the space provided.

26. List four ways that you can use energy more efficiently or use less energy.

27. Why is higher energy efficiency desirable?

Answer Key

1. c 2. c 3. b 4. b 5. d 6. c 7. b 8. a 9. d 10. a 11. b 12. c
13. false 14. true 15. true 16. false 17. false
18. work 19. created; destroyed 20. heat 21. net energy 22. less 23. LED or compact fluorescent 24. reduce 25. thermostat
26. Ride a bike or walk instead of driving. Use public transportation instead of driving. Be efficient about the trips you make: go out once to do a few things rather than go out a few times. Turn off lights and unplug appliances.
27. When energy efficiency is high, less energy is being wasted, resources last longer, and costs are kept down. }

20.3 Human Actions and Earth's Resources

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A renewable resource
 - a. will always be a renewable resource.
 - b. can be used so that it becomes non-renewable.
 - c. will always become a non-renewable resource.
 - d. none of these.
2. Wars have been fought over
 - a. oil
 - b. water
 - c. solar energy
 - d. gold
3. How many countries have almost 80% of all the world's oil?
 - a. 10
 - b. 11
 - c. 12
 - d. 13
4. Which country is NOT one of the biggest users of oil?
 - a. United States
 - b. China
 - c. Japan
 - d. Russia
5. What is the amount of usable energy available from a resource after subtracting the amount of energy needed to make the energy called?
 - a. energy efficiency
 - b. net energy
 - c. energy conservation
 - d. all of these
6. Which form of energy yields more net energy than any other source?
 - a. natural gas
 - b. wind
 - c. solar
 - d. petroleum
7. In the United States, what sector uses the most energy?

- a. industry
 - b. commercial
 - c. residential
 - d. transportation
8. Which type of light bulbs are the most energy efficient?
- a. halogen
 - b. incandescent
 - c. fluorescent
 - d. all of these are equally efficient
9. Wildlife is
- a. always a renewable resource
 - b. a renewable resource that can become nonrenewable
 - c. always a nonrenewable resource
 - d. not a resource
10. A high net energy ratio means that an energy source
- a. produces more energy than it takes to be harnessed
 - b. is less expensive than other energy sources
 - c. does not produce many pollutants
 - d. all of these

True or False

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

- _____ 11. Natural resource use is generally lower in developing countries because people cannot afford many products.
- _____ 12. The nations that consume the most oil are the nations that produce the most oil.
- _____ 13. Pollution from discarded material degrades the land, air, and water.
- _____ 14. Consumerism leads to greater resource use, but it also leads to more waste.
- _____ 15. All of our electronic wastes are recycled within our country.
- _____ 16. Electronic wastes pose a problem for human health and the environment.
- _____ 17. Recycling can help conserve natural resources.
- _____ 18. To get more energy, we use a lot of energy.
- _____ 19. Turning off lights when not in a room is an easy way to conserve energy.
- _____ 20. Replacing old appliances with newer models doesn't save energy.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. We need to _____ natural resources so they will last longer.
22. _____ describes how much useful work is extracted from one unit of energy.
23. In the developing world, _____ are often more lax, which lowers the cost of resource extraction.
24. _____ means that less energy is needed, which reduces costs.
25. Set _____ to automatically turn off heat or air conditioning when buildings are closed to conserve energy.
26. Energy can be used more efficiently getting more _____ out of each unit of energy.

27. Materials, such as gravel and sand, are technically _____ but there is so much of them available that we are unlikely to ever run out.
28. _____ can be regenerated or grow so rapidly that they reappear at the same rate or faster than they are used.
29. When we practice _____, we make sure resources will be available in the future.
30. _____ are resources that cannot be regenerated on a useful timescale.

Short Answer

Answer each question in the space provided.

31. If Nation A needs a natural resource that Nation B has a lot of, why might Nation A have trouble getting that resource from Nation B?

32. Why is energy conservation beneficial?

33. List 5 ways that natural resources can be conserved.

Answer Key

1. b 2. a 3. b 4. d 5. b 6. c 7. d 8. c 9. b 10. a

11. false 12. false 13. true 14. true 15. false 16. true 17. true 18. true 19. true 20. false

21. conserve 22. Energy efficiency 23. environmental regulations 24. Conserving energy 25. thermostats 26. work 27. non-renewable 28. Renewable resources 29. conservatism 30. Non-renewable resources

31. Nation A might not be able to afford the resource. Other nations might be able to pay more. Nation B might have a conflict with Nation A and not want to sell the resource. There could be other reasons.

32. Conserving energy means that less energy is needed, which reduces costs, ensures that non-renewable energy sources will last longer, and reduces political and environmental impacts.

33. Buy less stuff, reduce packaging, recycle, purchase products made with recycled materials, reduce pollution, prevent soil erosion, plant new trees, drive less, and conserve energy at home. }

CHAPTER

21**HS Human Actions and
Earth's Water Assessments****Chapter Outline**

- 21.1 HUMANS AND THE WATER SUPPLY**
 - 21.2 PROBLEMS WITH WATER DISTRIBUTION**
 - 21.3 WATER POLLUTION**
 - 21.4 PROTECTING THE WATER SUPPLY**
 - 21.5 HUMAN ACTIONS AND EARTH'S WATERS**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

21.1 Humans and the Water Supply

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. One of the largest water resources for California comes from which river?
 - a. Central Valley River
 - b. Sacramento River
 - c. Colorado River
 - d. Mississippi River
2. Regarding water use, developing nations use
 - a. a greater percentage for industry.
 - b. more for industry than for agriculture.
 - c. more for household uses than any other category.
 - d. a greater percentage for agriculture.
3. Water use in recreational activities accounts for what percentage of water usage?
 - a. 1%
 - b. 6%
 - c. 12%
 - d. 17%
4. What method of irrigation allows water to slowly trickle over crops?
 - a. slow irrigation
 - b. drip irrigation
 - c. low hanging irrigation
 - d. puncture irrigation
5. What percent of water is used for agriculture globally?
 - a. 27%
 - b. 45%
 - c. 66%
 - d. 91%
6. What percentage of water from traditional irrigation is wasted?
 - a. 15% - 36%
 - b. 5% - 10%
 - c. 33% - 45%
 - d. 37% - 84%
7. For aquaculture to be successful,
 - a. the species must be able to reproduce in captivity.

- b. the farms must be as close to a natural ecosystem as possible.
- c. the fish and shellfish stocks must be genetically engineered to survive in captivity.
- d. all of these.

8. Industrial uses of water include

- a. golf courses for CEOs to play on.
- b. ponds and lakes on industrial sites.
- c. cooling in power plants.
- d. all of these

9. The source of much of the groundwater used in California is

- a. the rain and snow that falls each year.
- b. seepage from the Pacific Ocean.
- c. seepage from the state's rivers.
- d. thousands of years of snow melt.

10. Water use in Northern and Southern California

- a. is equal. Both parts of the state use about the same amount of water.
- b. is greater in Northern, even though Southern receives more moisture.
- c. is greater in Southern, even though Northern receives more water.
- d. is variable. The relative amount each part receives changes annually.

True or False

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

- _____ 11. In normal year, about 40% of the water used in California comes from groundwater.
- _____ 12. Shrimp farms are converted from mangrove forests and salt marshes.
- _____ 13. One way to get farmers to use less water, is to have the government charge them more for it.
- _____ 14. Recreational and environmental water use is mostly consumptive.
- _____ 15. Aquaculture farmers have yet to develop a method of farming shellfish.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. Agriculture of the sea is known as _____.
17. The best way to water crops in the desert would be by _____.
18. _____ water use takes the water out of the ecosystem.
19. When water is recaptured, treated and returned to the water supply it is considered to be _____.
20. People use water for swimming, fishing, boating and other activities. This is a(n) use of water _____.
21. The water used by creatures in a wetland is a(n) _____ use of water.
22. Water shortages lead to a loss of lifeforms, known as a loss of _____.
23. California relies on _____ in the Sierra Nevada mountain to feed rivers with the water the state needs.

Short Answer

Answer each question in the space provided.

24. What actions should you take to use less water at home?

25. What are dangers of aquaculture?

Answer Key

1. a 2. d 3. a 4. b 5. c 6. a 7. a 8. c 9. d 10. c

11. true 12. true 13. true 14. false 15. false

16. aquaculture 17. drip irrigation 18. consumptive 19. non-consumptive 20. recreational 21. environmental 22. biodiversity 23. snow pack

24. Turn off the water when you are washing dishes, brushing teeth, and other activities. Convert your sprinkler system to a drip-irrigation system, install low-flow shower heads and low-flow toilets in your home.

25. Natural landscapes are destroyed to create the fish farms. These landscapes are rich ecosystems that protect shorelines from storm damage. Large predatory fish eat a lot so aquaculture is expensive and environmentally costly (to find something to feed the fish). Farmed fish are genetically different so they can damage wild populations if they escape. Parasites and illnesses are common with animals in such close proximity. }

21.2 Problems with Water Distribution

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Bacteria and other disease-causing agents found in water are known as
 - a. pathogens
 - b. halogens
 - c. carcinogens
 - d. partitians
2. If all bacteria reproduce in one minute and you start with 10 bacteria, after 5 minutes you have
 - a. 50
 - b. 160
 - c. 320
 - d. 500
3. Bacteria in water can grow at what rate?
 - a. exponentially
 - b. linearly
 - c. polynomially
 - d. none of the above
4. Water is a _____ resource, and it is _____.
 - a. renewable; unlimited
 - b. non-renewable; unlimited
 - c. renewable; limited
 - d. non-renewable; limited
5. People today use how much more water than they did 100 years ago?
 - a. 2 times
 - b. 4 times
 - c. 6 times
 - d. 10 times
6. Water scarcity can have dire consequences for which of the following?
 - a. people
 - b. environment
 - c. economy
 - d. all of the above
7. What percentage of the world's population does not have access to clean drinking water?
 - a. 10%

- b. 20%
 - c. 30%
 - d. 40%
8. What will happen to the amount of water available to each person in the future?
- a. it will increase
 - b. it will decrease
 - c. it will remain the same
 - d. it will become saltier
9. Which of the following areas receives the least amount of water per area per year?
- a. Kauai, Hawaii
 - b. Northern California
 - c. Northern Africa
 - d. Southern India
10. Although many people currently face water scarcity, it is estimated that by 2025,
- a. all nations will be able to provide clean water for their residents.
 - b. some people will not have access to clean water, but a smaller percentage than today.
 - c. about 40% of people will face water scarcity.
 - d. nearly half of people won't have enough water to meet their daily needs.
11. Pathogens include
- a. infectious bacteria
 - b. toxic chemicals
 - c. radioactive materials
 - d. all of these
12. Waterborne diseases are the leading cause of death
- a. nowhere ever.
 - b. in young children in many nations.
 - c. in people of all ages worldwide.
 - d. in people of all ages in many nations.

True or False

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

- _____ 13. No matter where you are in the world, if water comes out of a tap it is safe to drink.
- _____ 14. Many people in the world have no choice but to drink from the same polluted river where sewage is dumped.
- _____ 15. Getting rid of pathogens in contaminated water requires complicated, high-tech solutions.
- _____ 16. There is no sign of water scarcity today, but there could be in the future.
- _____ 17. Global warming has an effect on water supply.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. Other than drinking, the most important use of water is _____.
19. Nearly one quarter of the world's people have access to less water in a year than some people in the United States use in a _____.
20. Wars are now fought over energy, but someday they may be fought over _____.

21. The portion of the planet that is predicted to have the most serious water problems in 2024 is around the _____.
22. Deforestation keeps trees from returning water to the atmosphere by _____.
23. About 1.1 billion people, _____ of the entire population, does not have access to safe water.
24. Long periods with less rain than normal for a region are called _____.
25. Changes in rainfall patterns are predicted to occur in the future due to _____.

Short Answer

Answer each question in the space provided.

26. The map of projected water scarcity in 2025 has a regions that are blue (little or now water scarcity), many nations that are brown (economic water scarcity) and a large swath of red (physical water scarcity). Describe in general what this means and the general attributes of nations in each of those three color?

27. How is global warming predicted to affect water distribution?

Answer Key

1. a 2. c 3. a 4. c 5. c 6. d 7. d 8. b 9. c 10. d 11. a 12. b
13. false 14. true 15. false 16. false 17. true
18. washing or cleaning 19. day 20. water 21. equator 22. transpiration 23. one-fifth or 20% 24. droughts 25. global warming or climate change
26. Blue nations are developed nations. They can afford to move water from where it exists to where it is needed. These nations are mostly in the northern parts of the globe. Brown nations are developing nations. They may have water but they may not be able to distribute the water to where it is needed. Red nations will not have enough water available to them. Some regions are too poor to do much about it, others may need to find technological solutions; e.g. the middle east will develop desalination.

27. Global warming will change patterns of rainfall and water distribution. Regions may get more or less rain than they do now. There may be less snow and the snow may melt earlier in the spring. This means that regions with dry summers may not have runoff when they need the water. Changes in temperature and precipitation will affect the organisms that live in particular biomes.}

21.3 Water Pollution

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The Gulf of Mexico oil spill began with
 - a. a ship running around on a rocky shoal.
 - b. a rig that cracked apart in a storm.
 - c. a rig explosion that killed 11 workers.
 - d. an onshore pipeline breaking apart.
2. Booms placed on the ocean surface collect oil in which method of oil spill cleanup?
 - a. removal
 - b. dispersal
 - c. containment
 - d. sinkage
3. During the spill, NOAA imposed a fishing ban on how much area of the Gulf region?
 - a. one-half
 - b. one-third
 - c. one-fourth
 - d. the whole region
4. Coastal pollution is a big problem because
 - a. it can close beaches, which are important for recreation.
 - b. fish and shellfish that we rely on for food live in coastal areas.
 - c. people can become sick if they swim in contaminated coastal water.
 - d. all of these.
5. Industrial pollutants include
 - a. radioactive substances.
 - b. chemicals.
 - c. heat.
 - d. all of these.
6. Which method of dealing with the oil involves burning it?
 - a. removal
 - b. containment
 - c. dispersal
 - d. sinkage
7. Dead zones are found mostly
 - a. off of industrialized areas in developed nations.

- b. in the Gulf of Mexico.
 - c. off of farming areas in developing nations.
 - d. none of these.
8. The Gulf of Mexico oil spill was difficult to deal with because
- a. the type of oil was especially viscous.
 - b. the leak was in very deep water.
 - c. the rig was very close to shore.
 - d. all of these.
9. Chemical dispersants
- a. can be used to break up and spread apart oil.
 - b. are the method recommended by scientists to deal with an oil spill.
 - c. are made of generally safe chemicals.
 - d. all of these.
10. The temperature of a lake may rise if the water is
- a. released from a reservoir.
 - b. used to cool a power plant.
 - c. exposed to oil drilling.
 - d. all of these.

True or False

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

- _____ 11. Water pollution contributes to water shortages by making some water sources unavailable for use.
- _____ 12. One way to reduce pollution from an oil spill is to burn the oil.
- _____ 13. Animal waste, and fertilizers can help bring important nutrients to nearby water sources with their run off.
- _____ 14. Water pollution includes any contaminant that gets into lakes, streams, and oceans.
- _____ 15. Factory farms pollute ocean water with animal wastes.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. Oil rigs are built in deeper water than ever because of the development of new _____ techniques.
17. A change in the temperature of a natural water body caused by human activity is called _____.
18. Pollutants from the Mississippi River create a region with little life called a(n) _____ in the Gulf of Mexico.
19. Oil from a spill may kill _____, which form the base of the ocean food chain.
20. Most ocean pollution comes from _____.
21. A potent neurotoxin found in San Francisco Bay is the heavy metal, _____.
22. Wastewater from septic tanks, sewers, and yards are part of _____ pollution.
23. A dead zone forms when there is little dissolved _____ in the water.

Short Answer

Answer each question in the space provided.

24. Describe how a dead zone forms.

25. How did the Gulf of Mexico oil spill affect the people living in nearby regions?

Answer Key

1. c 2. c 3. b 4. d 5. d 6. a 7. a 8. b 9. a 10. b

11. true 12. true 13. false 14. true 15. true

16. drilling 17. thermal pollution 18. dead zone 19. plankton 20. the land 21. mercury 22. municipal 23. oxygen

24. Runoff picks up fertilizers and other wastes that contain nutrients. When a stream runs into a lake or coastal region, the nutrients promote algae growth. When the algae die they decompose, which uses all of the dissolved oxygen in the water. Without oxygen, fish and other organisms cannot live and so it becomes a dead zone.

25. NOAA imposed a fishing ban on about one-third of the Gulf since they were afraid the fish would be contaminated. Beaches were covered with oil or people were afraid that they were be so tourism was down. When the deep oil rigs were shut down for several months, people lost their jobs on the rigs. The economic impact to the region was high.}

21.4 Protecting the Water Supply

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Cleaning water pollutants in the ocean is difficult because
 - a. the ocean is so polluted
 - b. the ocean is cold
 - c. the ocean is so vast
 - d. the ocean is so deep
2. In what year was the Clean Water Act passed?
 - a. 1972
 - b. 1977
 - c. 1982
 - d. 1987
3. Contaminants in water that need to be treated include
 - a. bacteria, algae, viruses, and fungi
 - b. some elements
 - c. chemical pollutants
 - d. all of these
4. Water purification
 - a. increases acidity
 - b. does not always produce water that is safe for drinking
 - c. removes all contaminants
 - d. none of these
5. What can governments and international agencies do to prevent pollution and clean up the oceans?
 - a. pass laws
 - b. provide funding
 - c. enforce laws
 - d. all of the above
6. In a wastewater treatment plant, water is treated
 - a. in one single process.
 - b. in a two-step process.
 - c. in multiple processes.
 - d. over several years.
7. What was one goal of the Plan of Action of the 2002 Earth Summit?
 - a. To cut the number of people without access to safe drinking water by 2015 in half.

- b. To reduce to zero the number of people without access to safe drinking water by 2015.
 - c. To cut the number of people without access to safe drinking water by 2050 in half.
 - d. To reduce to zero the number of people without access to safe drinking water by 2050.
8. To discard motor oil
- a. put it in the storm sewers.
 - b. put it down the drain.
 - c. put it on the ground.
 - d. take it to an approved disposal facility.
9. The source of most ocean pollution is
- a. land
 - b. oil wells
 - c. marine organisms
 - d. ships at sea
10. Years after the Exxon Valdez oil spill
- a. the region was free of contaminants.
 - b. the rocks and sand beneath the beach surface were coated with oil.
 - c. there was oil coating all surfaces around the region.
 - d. oil continued to float along the surface of the water.

True or False

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

- _____ 11. Clean Water Act sets standards for water quality for industry, agriculture, and domestic uses.
- _____ 12. Water purification adds iron and sulphur to the water to make it drinkable.
- _____ 13. It is easier to clean water that has become polluted than to keep it from becoming polluted.
- _____ 14. The goal of water treatment is to make water suitable for such uses as drinking water, medicine, agriculture, and water parks.
- _____ 15. Wastewater contains hundreds of contaminants.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. To protect water, it is necessary to pass _____.
17. _____ nations have few or no water treatment facilities.
18. _____ produces drinking water by removing organisms, elements and chemical pollutants.
19. _____ removes contaminants, such as solids and particles from wastewater.
20. Since passage of the _____ many wastewater treatment plants have been constructed. .
21. The acronym for the Environmental Protection Agency is _____.
22. The acronym for the National Oceanic and Atmospheric Administration is _____.
23. Water conservation will become more important as human population _____.

Short Answer

Answer each question in the space provided.

24. What are some ways that you can conserve water in and around your home?

25. What does the clean water act give the Environmental Protection Agency the authority to do?

Answer Key

1. c 2. a 3. d 4. b 5. d 6. c 7. a 8. d 9. a 10. b

11.T 12.F 13.T 14.T 15.T

16. laws 17. underdeveloped or developing 18. water purification 19. sewage treatment 20. Clean Water Act 21. EPA 22. NOAA 23. rises or increases

24. To conserve water at home, use drip irrigation, turn off taps, take shorter showers, install water saving devices, water less, use human power rather than water; e.g. sweep rather than hose down areas.

25. The EPA has the authority to set standards for water quality for industry, agriculture and domestic uses. It can reduce the discharge of pollution, finance wastewater treatment plants and manage runoff. }

21.5 Human Actions and Earth's Waters

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Infectious organisms, such as bacteria or fungi, are called
 - a. pathogens
 - b. parasites
 - c. toxogens
 - d. diseasogens
2. People in some parts of the world cannot get enough clean water because
 - a. there is not enough water
 - b. they have no way to bring the water to the people
 - c. there is not enough money for treatment plants
 - d. all of these
3. Recreational activities account for what percent of water usage?
 - a. 1%
 - b. 5%
 - c. 30%
 - d. 45%
4. Scientists estimate that half of the world's population will not have enough water by what year?
 - a. 2015
 - b. 2020
 - c. 2025
 - d. 2030
5. Droughts
 - a. are entirely natural phenomena.
 - b. can be exacerbated by deforestation.
 - c. are increased by oil spills coating the water.
 - d. none of these.
6. How many people do not have access to safe water for drinking, hygiene, and domestic use?
 - a. 1.1 billion
 - b. 2.2 billion
 - c. 3.3 billion
 - d. 4.4 billion
7. What is the most widespread source of water contamination in developing countries?
 - a. municipal pollution

- b. agricultural pollution
 - c. raw sewage
 - d. industrial pollution
8. The percentage of people living with water scarcity globally is
- a. the same as it has been since 1995.
 - b. doubling each year.
 - c. decreasing as nations develop better water purification facilities.
 - d. none of these.
9. Recovery from the BP oil spill
- a. is complete.
 - b. is not over; more effects are being discovered.
 - c. was nearly complete after workers cleaned beaches and organisms.
 - d. is nearly done; there is just a bit of oil in beach sands.
10. Which of the following was harmed by the BP Oil Spill in 2010?
- a. endangered species
 - b. commercial fishing
 - c. tourism
 - d. all of the above

True or False

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

- _____ 11. Aquaculture is increasing human food resources.
- _____ 12. Aquatic organisms are extremely resistant to pollution.
- _____ 13. Thermal pollution can be harmful for aquatic organisms.
- _____ 14. The EPA has helped to improve water quality.
- _____ 15. Oil spills are well understood and easy to clean up.
- _____ 16. Many technologies are available to conserve water.
- _____ 17. Irrigation is only rarely used in agriculture today.
- _____ 18. Golf courses use very little water compared to other recreational activities.
- _____ 19. The winter snow pack of the Sierra Nevada mountains provides some of the water for California.
- _____ 20. Water is unevenly distributed around the world.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. _____ water use includes water than can be recycled and reused.
22. _____ water takes water out of the ecosystem.
23. _____ uses pipes and tubes to deliver small amounts of water directly to the soil at the roots of each plant or tree.
24. _____ occur when a region experiences usually low precipitation for months or years.
25. About _____ of all diseases are caused by drinking unsafe water.
26. A _____ is an area of hundreds of kilometers of ocean with fish or plant life.
27. _____ is any rise or fall in water temperature that is not weather related.

28. _____ removes contaminants, such as solids and particles, from sewage.
29. Drinking water is produced through the process of _____.
30. In the United States, the Clean Water Act gives the _____ the authority to set water quality standards.

Short Answer

Answer each question in the space provided.

31. What is the best way to have clean water (to keep it clean or to clean it once it's polluted)? How does society see to it that this happens?

32. What creates a dead zone?

33. Explain the methods for dealing with oil spills.

Answer Key

1. a 2. d 3. a 4. c 5. b 6. a 7. d 8. c 9. b 10. d

11. true 12. false 13. true 14. true 15. false 16. true 17. false 18. false 19. true 20. true

21. Non-consumptive 22. Consumptive 23. Drip irrigation 24. Drought 25. 88% 26. dead zone 27. thermal pollution 28. sewage treatment 29. water purification 30. EPA (Environmental Protection Agency)

31. The best way to have clean water is to keep it clean. The only way to be sure this happens is to have laws that regulate the amount of pollution that is allowed to be emitted.

32. Fertilizers run off in river water. This promotes algae growth offshore. When the algae die, they are decomposed by bacteria. The bacteria use up all the dissolved oxygen in the water and there is none left for fish and other aquatic organisms. So there is little life in that part of the ocean; hence the name dead zone.

33. Removal: oil is corralled and then burned, containment: floating containment booms hold back the oil, dispersal: oil disperses naturally over time but the process can be sped up by using chemicals. }

CHAPTER

22**HS Human Actions and the Atmosphere Assessments****Chapter Outline**

- 22.1 AIR POLLUTION**
 - 22.2 EFFECTS OF AIR POLLUTION**
 - 22.3 REDUCING AIR POLLUTION**
 - 22.4 HUMAN ACTIONS AND THE ATMOSPHERE**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

22.1 Air Pollution

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. 9 out of 10 of the smoggiest cities are in which state?
 - a. California
 - b. New York
 - c. Texas
 - d. Florida
2. In the US, western cities experience more _____ pollution and eastern cities experience more _____ - _____ pollution
 - a. primary; secondary
 - b. tropospheric; stratospheric
 - c. secondary; primary
 - d. stratospheric; tropospheric
3. Slash-and-burn is done primarily
 - a. for energy
 - b. to clear land for agriculture
 - c. to clear land for construction
 - d. none of these
4. How many pollutants does the Clean Air Act regulate?
 - a. 100
 - b. 89
 - c. 189
 - d. 289
5. How many tons of pollutants are entered into the atmosphere every year?
 - a. 1 million
 - b. 16 million
 - c. 90 million
 - d. 160 million
6. Pollutants may collect
 - a. on the leeward side of mountain ranges.
 - b. in inversions.
 - c. when there is little wind.
 - d. all of these.
7. Materials that are naturally occurring, but added to the atmosphere in abnormal quantities are known as

- a. pathogens
 - b. pollutants
 - c. carcinogens
 - d. spills
8. Smog that forms from a reaction with sunlight is known as
- a. photographic smog
 - b. photochemical smog
 - c. photosynthesized smog
 - d. photogenic smog
9. Pollutants remain over an area until they
- a. are transported away by wind
 - b. carried to the ground by rain or snow
 - c. transformed into other compounds
 - d. all of these
10. Nitrogen oxides
- a. form from chemical reactions in car exhaust in sunlight.
 - b. are greenhouse gases and contribute to acid rain.
 - c. are converted to a toxic form by bacteria.
 - d. all of these.
11. A lot of pollutants come from coal and petroleum
- a. whenever they are burned.
 - b. when they are pure.
 - c. when they burn incompletely.
 - d. none of these
12. The pollutants from biomass burning are much the same as from fossil fuel burning because
- a. biomass and fossil fuels are the same type of material in different forms
 - b. nearly all things burn to produce the same particles and gases
 - c. biomass is a type of fossil fuel
 - d. none of these

True or False

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

- _____ 13. Particulate pollution can reduce photosynthesis.
- _____ 14. Nearly half of air pollution in the US comes from transportation.
- _____ 15. Burning fossil fuels releases carbon dioxide into the atmosphere.
- _____ 16. The six most important pollutants regulated by the clean air act are ozone, particulates, sulfur dioxide, nitrogen dioxide, carbon dioxide and lead.
- _____ 17. Mercury is not toxic as a gas, but after bacteria convert it to methyl mercury.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The Clean Air Act was signed in the year _____ .
19. The carbon, nitrogen and sulfur oxides; particulates, lead and some organic compounds are _____-pollutants.

20. Once widely used in paint, gasoline and pipes, this pollutant causes brain damage and blood poisoning: _____ - _____ .
21. An odorless, colorless gas that is harmless in the atmosphere except as a greenhouse gas is _____ .
22. Burning coal and petroleum produces SO_2 , which mixes with water in the to produce _____ .
23. _____ enter the atmosphere from volcanic eruptions, windblown dust, industry and vehicles .
24. Volatile organic compounds enter the atmosphere by _____ .
25. In an oxygen-poor environment, organic material decomposes to form the greenhouse gas _____ .

Short Answer

Answer each question in the space provided.

26. How does ozone pollution form? Where in the U.S. is it the most common?

27. If smoke from burning trees or dust blown in wind is natural, why is it considered a pollutant? What type of pollutant is it?

Answer Key

1. b 2. c 3. b 4. c 5. d 6. d 7. b 8. b 9. d 10. c 11. c 12. a
13. true 14. true 15. true 16. true 17. false
18. 1970 19. primary 20. lead 21. carbon dioxide 22. sulfuric acid 23. particulates 24. evaporation 25. methane
26. Ozone is created by a chemical reaction between exhaust and sunlight. Since sunlight is needed for it to form, it tends to form in the summer in warm dry cities like Los Angeles, Phoenix, and Denver.
27. Burning trees and windblown dust are particulates. They are pollutants when they are present in large amounts in the atmosphere and especially when they collect in places to make the air dangerous.}

22.2 Effects of Air Pollution

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Particulates
 - a. increase asthma attacks.
 - b. significantly reduce rates of skin cancer.
 - c. are responsible for neurological diseases.
 - d. have no effect on human health.
2. 1% loss of ozone can increase skin cancer cases by what percent?
 - a. 1%
 - b. 6%
 - c. 9%
 - d. 12%
3. Because of pollution, people in the United States can see about _____ as far as they could see 200 years ago.
 - a. 100%
 - b. 55%
 - c. 20%
 - d. 0%
4. Ozone a pollutant in the _____, but beneficial in the _____.
 - a. stratosphere; thermosphere
 - b. thermosphere; troposphere
 - c. ionosphere; thermosphere
 - d. troposphere; stratosphere
5. Limestone buildings and sculptures are eroded primarily by which of the following?
 - a. UV radiation
 - b. acid rain
 - c. ozone pollution
 - d. CFCs
6. The phenomenon of pollutants adding up in an organism for life is known as
 - a. bioaccumulation
 - b. accumulation
 - c. bioaddition
 - d. biopollutants
7. Which fish species would typically contain the most mercury?

- a. krill
 - b. shark
 - c. trout
 - d. oyster
8. Which human-made chemical primarily breaks down ozone molecules?
- a. CFCs
 - b. NOs
 - c. TNT
 - d. NOAA
9. On the pH scale, 7 is _____; below 7 is _____; above 7 is _____.
- a. neutral; basic; acidic
 - b. pure acid; basic; acidic
 - c. neutral; acidic; basic
 - d. pure base; basic; acidic
10. When the pH of a lake drops below 4.5,
- a. fish cannot live
 - b. organic material cannot decay
 - c. wildlife populations decline
 - d. all of these
11. Acid rain is a problem
- a. directly below where it is created
 - b. far downwind from where it is created
 - c. everywhere
 - d. only in places where there is a lot of limestone
12. One single CFC molecule can destroy as many as _____ ozone molecules.
- a. 10
 - b. 1,000
 - c. 100,000
 - d. 10 million

True or False

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

- _____ 13. Lung cancer rates are increasing entirely because the numbers of smokers are increasing.
- _____ 14. Ozone loss near the North and South Poles is about the same.
- _____ 15. A small amount of air pollution has no effect on human health.
- _____ 16. Particulates reduce the amount of sunshine that reaches the ground.
- _____ 17. Acid rain is produced by nitrogen and sulfur-oxides in the atmosphere.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. High _____ levels increase asthma, lung disease and viral infections, such as the flu.
19. _____ occurs as the addition of toxic substance concentrations increase up the food web.
20. _____ has been a big problem in dissolving limestone structures.
21. Compounds that bioaccumulate are usually stored in the organism's _____.

22. Acid rain is neutralized by _____ rocks.
23. The ozone layer protects Earth surface from _____.
24. For ozone loss to occur, CFCs freeze onto nitric acid molecules in _____.
25. It is likely that the Mad Hatter was mad because he had _____ poisoning.

Short Answer

Answer each question in the space provided.

26. Describe how ozone breaks down beginning in the polar spring.

27. How does bioaccumulation of mercury occur?

Answer Key

1. a 2. b 3. c 4. d 5. b 6. a 7. b 8. a 9. c 10. d 11. b 12. c
13. false 14. false 15. false 16. true 17. true
18. ozone pH scale 19. bioaccumulation 20. acid rain 21. fat 22. carbonate 23. ultraviolet radiation (high energy UVC) 24. polar stratospheric clouds 25. mercury
26. CFCs are frozen into polar stratospheric clouds when sunlight hits and starts the air moving. UV light breaks the CFCs apart and the chlorine floats away. It attaches onto one of the oxygen atoms in an ozone and pulls it away. This leaves behind an O₂. The Cl combines with the O briefly and then moves onto destroy another ozone.
27. Mercury enters the atmosphere when coal is burned. The mercury forms small droplets that end up on the ground. Bacteria convert the mercury to methyl mercury. Methyl mercury ends up in seawater where plankton take it in. These tiny organisms accumulate all of the mercury they ingest and then pass it on to the slightly larger organisms that eat them. Each organism gathers all of the mercury it eats in its lifetime. Finally, large predatory fish, like tuna, have a lot of mercury in their bodies. When we eat tuna, we get all of that mercury in our bodies. }

22.3 Reducing Air Pollution

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A carbon tax
 - a. encourages people to behave in ways that reduce carbon emissions.
 - b. encourages conservation.
 - c. charges money for carbon emissions.
 - d. all of the above
2. A vehicle that runs on gasoline and electric power is known as
 - a. a hybrid vehicle
 - b. a combustible engine vehicle
 - c. an electric vehicle
 - d. a diesel vehicle
3. Catalytic converters
 - a. break down carbon dioxide into carbon monoxide and oxygen.
 - b. only work when they are hot.
 - c. reduce pollutants in autos to nearly zero.
 - d. all of these.
4. In 1985, the British Antarctic Survey found that ozone levels
 - a. over the South Pole were decreasing.
 - b. over both poles were increasing.
 - c. were lower over the poles, although they were stable.
 - d. none of these.
5. Removing carbon from the atmosphere is known as
 - a. carbon sequestration
 - b. carbon stealing
 - c. unpolluting
 - d. carbon burying
6. Since the passage of the Clean Air Act, emissions of the six major pollutants have decreased by how much?
 - a. 10%
 - b. 50%
 - c. 70%
 - d. 90%
7. To best develop alternative energy sources,
 - a. develop wind and solar everywhere.

- b. develop the appropriate source for a region.
 - c. nuclear is more useful than wind or solar.
 - d. give up and use fossil fuels.
8. The part on a car that speeds up chemical reactions and break down nitrous oxides are called
- a. fuel injector
 - b. fuel cell
 - c. catalytic converter
 - d. air intake
9. The system that gives monetary incentives to nations to develop emission reducing technologies
- a. trade-and-spend
 - b. spend-and-reduce
 - c. cap-and-trade
 - d. cap-and-reduce
10. In the process of gasification,
- a. coal is superheated to make syngas, filtered and then used.
 - b. a small amount of energy creates a large amount of clean energy.
 - c. biofuels are added to gasoline to create a cleaner fuel.
 - d. all of these.
11. The Montreal Protocol
- a. controls greenhouse gas emissions.
 - b. phases out the production of hazardous substances in developing nations and then in developed nations.
 - c. requires that more developed nations assist developing nations.
 - d. all of these.
12. An example of artificial carbon sequestration is carbon
- a. being stored by a forest.
 - b. being placed in salt layers or coal seams.
 - c. entering seawater.
 - d. all of these.

True or False

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

- _____ 13. A fuel cell converts solar energy into electrical energy.
- _____ 14. Removing particles from emissions is a difficult process.
- _____ 15. Ozone destruction creates the ozone hole where the layer is dangerously thin.
- _____ 16. By doing nothing about climate change, we are doing something.
- _____ 17. Without the Montreal Protocol, there would have been a huge increase in skin cancer cases in the U.S.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A substance that increases (or decreases) the rate of a chemical reaction but is not used up in the reaction is called a(n) _____.
19. Carbon can be removed from the atmosphere through the process of _____.
20. Ethanol, fuel made from corn is a(n) _____.
21. To reduce pollutants, modern cars are equipped with a(n) _____.

22. A _____ converts chemical energy into electrical energy.
23. To encourage energy efficiency, people could be charged a(n) _____ when they emit carbon dioxide.
24. Trees in a forest store carbon dioxide. When the forest burns, the greenhouse gas _____.
25. Wild ideas about capturing carbon or putting a mirror into orbit to reflect sunlight are in the field of _____ - _____.

Short Answer

Answer each question in the space provided.

26. How did the Montreal Protocol help the ozone layer?

27. Describe how artificial carbon capture and sequestration might work. Is this happening now?

Answer Key

1. d 2. a 3. b 4. a 5. a 6. b 7. b 8. c 9. c 10. a 11. c 12. d
13. false 14. true 15. true 16. true 17. true
18. catalyst 19. carbon sequestration 20. biofuel 21. catalytic converter 22. fuel cell 23. carbon tax 24. enters the atmosphere or is released 25. geoengineering
26. The Montreal Protocol controls the production and consumption of 96 ozone damaging chemicals. Hazardous chemicals are first phased out in developed nations and one decade later in developing nations or quicker. Especially dangerous substances, like CFCs, were phased out by 1995 but others will not be totally gone until 2030. Wealthier nations need to donate money to less developed nations.
27. Carbon is collected from emissions at a gasification plant. The carbon is stored underground in salt layers or coal seams. This is being researched but it has not been attempted on a large scale. }

22.4 Human Actions and the Atmosphere

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Pregnant women and young children should not eat much shark, pike, albacore and halibut because of
 - a. the possibility of lead poisoning.
 - b. bioaccumulation of mercury.
 - c. volatile organic compounds.
 - d. none of these.
2. Which of the following is NOT a primary pollutant?
 - a. carbon dioxide
 - b. nitrogen oxide
 - c. sulfur dioxide
 - d. ozone
3. When does the amount of photochemical smog peak?
 - a. dawn
 - b. midday
 - c. twilight
 - d. night
4. Rain
 - a. is naturally acidic.
 - b. turns to acid rain from ozone in the troposphere.
 - c. has become more alkaline in some locations in recent decades.
 - d. all of these.
5. Which pollutant reduces visibility?
 - a. ozone
 - b. oxides
 - c. particulates
 - d. none of these
6. The effect of CFCs on stratospheric ozone was first discovered
 - a. from mathematical calculations.
 - b. by ozone measurements over Antarctica.
 - c. when temperatures began to rise.
 - d. when carbon dioxide levels began to rise.
7. It is important to develop biofuels as an alternative energy source because they
 - a. have a greater net energy than other sources.

- b. can be used to power cars and trucks.
 - c. take no processes, just grow them and go.
 - d. all of these
8. Which of the following is NOT a possible effect of ozone loss?
- a. cataracts
 - b. skin cancer
 - c. reduced crop yields
 - d. respiratory illnesses
9. What reduces air pollutants from motor vehicles?
- a. muffler
 - b. fuel cell
 - c. catalytic converter
 - d. all of these
10. The effect of banning CFCs has been to
- a. increase the ozone hole
 - b. stabilize the ozone hole
 - c. eliminate the ozone hole
 - d. none of these

True or False

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

- _____ 11. The energy from hydrogen fuel cells comes from breaking apart hydrogen.
- _____ 12. The Montreal Protocol banned ozone-destroying substances abruptly.
- _____ 13. Increased particles in the air could increase rainfall.
- _____ 14. Using food crops like corn for biofuels can increase food prices.
- _____ 15. The Clean Air Act regulates only six pollutants.
- _____ 16. Clean coal releases almost no greenhouse gases.
- _____ 17. Photochemical smog occurs most in hot, humid locations.
- _____ 18. The increase in motor vehicles in and around cities has increased ozone and other pollutants.
- _____ 19. Particulates reduce the amount of sunshine that can reach the ground.
- _____ 20. The asthma rate has been decreasing worldwide.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. Algae may be a better source of _____ than food crops like corn .
22. _____ provides a monetary incentive for nations to develop technologies that will reduce emissions.
23. A _____ is a financial method of trying to reduce carbon dioxide emissions.
24. To remove carbon dioxide from the atmosphere, you could plant trees. This is one method of _____.
25. _____ can cause brain damage or blood poisoning.
26. Nitrogen- and sulfur-oxides emitted from coal plants creates _____.
27. To clear land for farming, forests may be burned in a process known as _____.
28. _____ can occur naturally from volcanic eruptions or windblown dust.

29. _____ is a greenhouse gas that forms when organic material rots.

30. In the stratosphere, _____ screens out harmful ultraviolet radiation.

Short Answer

Answer each question in the space provided.

31. Why might algae be a better source of biofuels than corn or other food crops?

32. Explain what caused the ozone hole. What effect has the Montreal Protocol had on it?

33. What does the Clean Air Act do? What has been the result of its passage? Has it solved the problem it was meant to solve?

Answer Key

1. b 2. d 3. c 4. a 5. c 6. a 7. b 8. d 9. c 10. b

11. false 12. false 13. true 14. true 15. false 16. false 17. false 18. true 19. true 20. false

21. biofuel 22. cap-and-trade 23. carbon tax 24. carbon sequestration 25. mercury 26. acid rain 27. slash-and-burn agriculture 28. particulates 29. methane 30. ozone

31. Corn and other crops should be used for feeding people and animals. When food crops are used for biofuels, the price goes up. Growing these crops uses a lot of fertilizers, pesticides and energy, which is not good for the environment. It also takes space. Algae can grow in places that are not useful for food, like deserts.

32. The ozone hole is an area where the ozone layer is dangerously thin surrounding the South Pole. The reactions of CFCs and ozone in the stratosphere causes ozone to break down. The Montreal Protocol got nations to phase out the worst ozone destroying substances. The hole was largest in 2006 and it shrinks and grows depending on the conditions each year, but it is stabilizing and will shrink in the coming decades.

33. The Clean Air Act regulates 189 pollutants; the six most important are ozone, particulates, sulfur dioxide, nitrogen dioxide, carbon monoxide and lead. As a result of the act the air in the US is much cleaner. Visibility is better; people are healthier. There is still a lot of pollution that gets into the atmosphere so the act has not solved the problem entirely. }

CHAPTER

23**HS Observing and
Exploring Space Assessments****Chapter Outline**

- 23.1** **TELESCOPES**
 - 23.2** **EARLY SPACE EXPLORATION**
 - 23.3** **RECENT SPACE EXPLORATION**
 - 23.4** **OBSERVING AND EXPLORING SPACE**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

23.1 Telescopes

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A spectrometer can determine all of the following except
 - a. the temperature of the star.
 - b. the composition of the star
 - c. whether the star is moving towards or away from Earth.
 - d. the rotational speed of the star.
2. If you see a star that is 30,000 light years away, you are viewing it as it
 - a. appears right now
 - b. appeared 1 light year ago
 - c. appeared 30,000 years ago
 - d. appeared when it formed
3. If you wanted to view the stars in the night sky, would you use
 - a. an electron microscope
 - b. a refracting telescope
 - c. a magnifying glass
 - d. a radio telescope
4. The distance between two wave peaks is known as
 - a. frequency
 - b. amplitude
 - c. wavelength
 - d. voltage
5. What does a light year measure?
 - a. time
 - b. distance
 - c. luminosity
 - d. chemistry
6. An electromagnetic wave
 - a. has an electric field and a magnetic field.
 - b. oscillates between high and low energy values.
 - c. is visible to the human eye.
 - d. all of these
7. The _____ the wavelength, the _____ the frequency.
 - a. Longer; lower

- b. longer; higher
 - c. shorter; lower
 - d. none of these
8. What is the speed of light?
- a. 300,000,000 meters per second
 - b. 3,000,000 meters per second
 - c. 300 meters per second
 - d. 3,000,000,000 meters per second
9. Visible light is
- a. a small part of the electromagnetic spectrum.
 - b. the only light that humans can detect.
 - c. best for observing astronomical objects.
 - d. all of these
10. The faintest, most distance objects are observed as
- a. gamma rays
 - b. ultraviolet rays
 - c. visible light
 - d. radio waves
11. Space telescopes are important because they are
- a. less expensive to operate than land-based telescopes.
 - b. above most of the atmosphere, which gives them better access to starlight.
 - c. able to gather more types of waves than land-based telescopes.
 - d. simpler to use than land-based telescopes so more astronomers have access to them.
12. The Greeks knew that planets were different from stars because they
- a. are larger and brighter
 - b. move in the opposite direction
 - c. wander across the background of the other stars
 - d. are not included in any constellations

True or False

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

- _____ 13. Electromagnetic radiation energy that is transmitted through space as a photon.
- _____ 14. A light-years is the amount of light that reaches Earth in one year.
- _____ 15. Radio telescopes are linked together to observe the same object so that they can gather more data on that object.
- _____ 16. If you view the Andromeda Galaxy through a telescope, you are seeing it as it was 2.5 million years ago.
- _____ 17. SETI is the Search for Extra-Terrestrial Intelligence.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A pattern of stars in the sky is a(n) _____.
19. A high-energy band of the electromagnetic spectrum, _____, are useful in both astronomy and medicine.
20. A telescope that uses mirrors to collect and focus light is a(n) _____.

21. A(n) _____ can travel long distances due to its long wavelength.
22. A(n) _____ is a scientist who uses telescopes and other tools to study the universe.
23. Hubble, a _____ telescope, has been in orbit since 1990
24. Starlight can be broken into colors by a(n) _____.
25. The shortest wavelength, highest energy part of the electromagnetic spectrum is _____.

Short Answer

Answer each question in the space provided.

26. Make a simple diagram of the electromagnetic spectrum. Show higher and lower energy, longer and shorter wavelengths, infrared, x-rays, radio waves, visible light, and gamma rays.

27. What did Galileo observe with his (very primitive) telescope?

Answer Key

1. d 2. c 3. b 4. c 5. b 6. a 7. a 8. a 9. a 10. d 11. b 12. c
13. false 14. false 15. true 16. true 17. true
18. constellation 19. X-rays 20. reflecting telescope 21. radio wave 22. astronomer 23. space 24. spectrometer 25. gamma ray
26. See text for diagram in the section "The Electromagnetic Spectrum".
27. Galileo observed that (1) there are more stars in the night sky than we can see with the naked eye, (2) the Milky Way is actually many stars, (3) the Moon has craters, (4) Venus has phases like our Moon, (5) Jupiter has moons that orbit the planet, (6) there are dark spots that move across the Sun's surface.}

23.2 Early Space Exploration

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Voyager 1 is the first human-made object to
 - a. leave Earth's orbit.
 - b. orbit the Sun.
 - c. fly by Pluto.
 - d. leave interstellar space.
2. An satellite with an orbit that is fixed above one location over Earth is known as what type of orbit?
 - a. polar
 - b. low earth orbit
 - c. high earth orbit
 - d. geostationary
3. Which of the following is one of Newton's Laws of Motion?
 - a. To every action, there is an equal and opposite reaction.
 - b. An object in motion will remain in motion forever and always.
 - c. Every object is attracted to every other object proportionately to its volume.
 - d. Gravity equals mass times the speed of light.
4. The reaction force that propels rockets into space is known as
 - a. friction
 - b. thrust
 - c. momentum
 - d. gravitational pull
5. What was the name of the first artificial satellite to orbit Earth?
 - a. Explorer
 - b. Apollo 11
 - c. Sputnik 1
 - d. Sputnik 9
6. The first satellite was launched in _____ and the first man stepped on the moon in _____, a difference of _____ years.
 - a. 1949; 1972; 23
 - b. 1953; 1968; 15
 - c. 1957; 1969; 12
 - d. 1971; 1979; 8
7. The purpose of using multiple stages in a rocket is to

- a. be able to take humans into space.
 - b. be able to orbit Earth.
 - c. reduce the rocket's weight in steps.
 - d. none of these.
8. An object can go into orbit because of the law of
- a. universal gravitation.
 - b. conservation of momentum.
 - c. angular momentum.
 - d. none of these.
9. Which two countries were involved in the space race?
- a. China India
 - b. U.S.A and U.S.S.R.
 - c. Brazil U.S.S.R.
 - d. U.S.A. U.K.
10. For a rocket to enter Earth orbit, it must be launched
- a. at the right speed.
 - b. from the right location.
 - c. straight up.
 - d. all of these.
11. The American president who committed the U.S. to being the first to land a man on the moon was
- a. John F. Kennedy
 - b. Jimmy Carter
 - c. Franklin D. Roosevelt
 - d. Harry Truman
12. The military, social and political conflict between the U.S. and the Soviet Union
- a. resulted in a large ground war.
 - b. was known as the Cold War.
 - c. was known as the Space Race.
 - d. led to World War II.

True or False

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

- _____ 13. The only two nations to put a human on the moon so far are the U.S. and China.
- _____ 14. A satellite is an object that orbits a smaller object.
- _____ 15. The mission to put a man on the Moon was Apollo 11.
- _____ 16. There are records showing rockets have been in existence since the 13th century.
- _____ 17. Newton's Third Law of Motion helps explain how a rocket will travel in space.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The first living creature in space was a(n) _____.
19. Satellites that orbit relatively close to Earth are in a(n) _____.
20. A _____ is an unmanned spacecraft that collects data on objects in space.
21. The path a satellite takes around an object is its _____.

22. Force equals mass times _____.
23. The launch of the spacecraft _____ by the country _____ ignited the Space Race.
24. We can only be connected by mobile phones because we have _____.
25. If you wanted to keep an eye on the weather of a particular region on Earth, you would put a satellite in a _____ orbit.

Short Answer

Answer each question in the space provided.

26. How does a rocket move through the vacuum of space?

27. How did the conflict between the U.S. and the U.S.S.R. lead to Neal Armstrong's step on the Moon?

Answer Key

1. d 2. d 3. a 4. b 5. c 6. c 7. c 8. a 9. b 10. c 11. a 12. b
13. false 14. false 15. true 16. true 17. true
18. dog 19. low Earth orbit 20. space probe 21. orbit 22. acceleration 23. Sputnik 1; USSR 24. communications satellites 25. geostationary
26. The rocket has fuel that is ignited, causing an explosion of gases. The explosion creates pressure that forces gases out of the rocket. The gases fly out of the rocket and push the rocket in the opposite direction, according to Newton's Third Law of Motion.
27. After WWII the U.S. and USSR were in a Cold War. There were few actual military confrontations but each nation tried to develop the best weapons. This race helped to drive technology; e.g. the development of missiles sped up rocket technologies. When the USSR launched Sputnik in 1957, Americans worried that the USSR was winning the Cold War and the Space Race was launched, with the US launching its first satellite in 1958. President

Kennedy announced in 1961 that the US would put a man on the moon before the end of the decade and they did. Neal Armstrong stepped on the moon in July 1969. }

23.3 Recent Space Exploration

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. How many Space Shuttle disasters have there been?
 - a. 0
 - b. 1
 - c. 2
 - d. 4
2. The International Space Station has had people on board since _____, and it is _____.
 - a. 1969; is joint project between the US and USSR/Russia.
 - b. 1989; is solely a US spacecraft.
 - c. 2000; is a joint project between several nations.
 - d. 2008; solely a Russian spacecraft.
3. Skylab was launched in _____, and it was _____.
 - a. 1971; the first space station
 - b. 1969; a launch pad for the Apollo missions
 - c. 1973; the first American space station
 - d. 1979; an international project between the US and the USSR
4. One major focus of space exploration currently is
 - a. putting humans back on the Moon.
 - b. sending a team to Mars and back.
 - c. chemical study of the rocks of Venus.
 - d. seeking places that might once have been hospitable to life.
5. Which planet currently has rovers on it?
 - a. Jupiter
 - b. Mars
 - c. Mercury
 - d. Venus
6. A space station is
 - a. launched and constructed in pieces.
 - b. designed for defense purposes.
 - c. home to astronauts from one country at a time.
 - d. none of these.
7. What features make a space shuttle unique?
 - a. It can explore the inner solar system.

- b. It can haul cargo into space.
 - c. It can fly like an airplane.
 - d. It can land on the moon and return.
8. If you want to see what happened to a lake before and after a hurricane, you would use
- a. geospatial satellites.
 - b. Landsat images.
 - c. rovers.
 - d. none of these.
9. A space station in orbit is powered by
- a. nuclear energy.
 - b. fossil fuels.
 - c. solar energy.
 - d. all of these.
10. Smaller solar system objects, like asteroids, may give us clues as to
- a. how the solar system formed.
 - b. what planets are made of.
 - c. when the solar system formed.
 - d. all of these.

True or False

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

- _____ 11. One purpose of the International Space Station is to conduct medical research.
- _____ 12. The booster rockets attached to the space shuttle are the only part of the space shuttle that are not reusable.
- _____ 13. Although astronomers have attempted, they have yet to place a satellite that can orbit at the same rate that Earth spins.
- _____ 14. Mir is the Russian space center.
- _____ 15. The record for one crew inhabiting a space station is ten years.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. Besides studying other solar system bodies, NASA satellites keep an eye on planet _____.
17. If you wanted to live for several months in space, you would try to get aboard a(n) _____.
18. The space shuttle launched from _____, but landed in one of several places.
19. The part of the space shuttle that comes back to Earth with astronauts aboard is the _____.
20. A space shuttle takes off like a(n) _____ and lands like a _____.
21. Humans are currently in orbit around Earth in the _____.
22. Besides Earth, the planet we know the most about is _____.
23. Looking for conditions that might have allowed microbial life, the Curiosity _____ vehicle explores the planet _____.

Short Answer

Answer each question in the space provided.

24. What caused the accidents that brought down two space shuttles and killed their crews?

25. Why are satellites important for understanding changes on Earth? Give an example.

Answer Key

1. c 2. c 3. d 4. d 5. b 6. a 7. b 8. b 9. c 10. a

11. true 12. false 13. false 14. false 15. false

16. Earth 17. space station 18. Cape Canaveral, Florida 19. orbiter 20. rocket; glider plane 21. International Space Station 22. Mars 23. rover; Mars

24. The Challenger shuttle had a faulty o-ring in one of the rocket boosters and broke apart just 73 seconds after launch. The Columbia shuttle had a small piece of insulating foam break off of the fuel tank and smash into the front of one wing, which damaged a tile. The tiles protect the shuttle from the excessive temperature of gliding through the atmosphere. When the shuttle re-entered Earth's atmosphere, the temperatures were too high and the shuttle broke apart.

25. Satellites can get a big view of Earth systems. They can also compare views over time. For example, the extent of the polar ice sheets is changing and satellite views taken at the same time of year over a number of years can detect how. }

23.4 Observing and Exploring Space

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. How long does it take sunlight to get from the Sun to Earth?
 - a. 8 seconds
 - b. 8 minutes
 - c. 8 hours
 - d. 8 days
2. After the sun, which star is closest to us?
 - a. Sirius
 - b. Polaris
 - c. Betelgeuse
 - d. Proxima Centauri
3. The distance between two adjacent oscillations is called a(n)....
 - a. wavelength
 - b. frequency
 - c. amplitudes
 - d. crest
4. Which telescopes are best for the viewing the surface of Earth's moon or the rings of Saturn?
 - a. refracting telescope
 - b. reflecting telescope
 - c. radio telescope
 - d. none of the above
5. Who created the first reflecting telescope?
 - a. Galileo
 - b. Sir Isaac Newton
 - c. Hermann Oberth
 - d. John Herschel
6. With his first telescope, Galileo could see
 - a. stars outside our galaxy.
 - b. the orbiting moons of Mars.
 - c. sunspots.
 - d. all of these
7. The United States space program has
 - a. spacecraft out beyond the edges of the solar system.

- b. rovers on Mars.
 - c. satellites around the inner planets.
 - d. all of these.
8. Satellite studying Earth can tell us
- a. how Earth systems affect one another.
 - b. what the weather will be like in a region
 - c. how the planet changes over time.
 - d. all of these.
9. The rover, Curiosity, is
- a. studying Mars to see if conditions were once favorable to life.
 - b. passing out of the solar system into interstellar space.
 - c. going to be the first craft to land on the moon in more than three decades.
 - d. in the atmosphere of Venus to learn about greenhouse effect.
10. Which type of orbit are most weather satellites put in?
- a. geostationary
 - b. low earth
 - c. high earth
 - d. none of these

True or False

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

- _____ 11. The galaxy we live in, the Milky Way, is about 100,000 light years across.
- _____ 12. Visible light is a large part of the electromagnetic spectrum.
- _____ 13. Very hot stars emit light primarily in the ultraviolet wavelength.
- _____ 14. The earliest telescopes were refracting telescopes.
- _____ 15. The United States launched Sputnik on October 4, 1957.
- _____ 16. President Truman established NASA.
- _____ 17. All five space shuttles performed many missions and returned to Earth safely.
- _____ 18. Mir and the International Space Station housed scientists from the US, Russia and elsewhere.
- _____ 19. Early space exploration was driven by cooperation between the United States and the USSR.
- _____ 20. The Space Shuttle program ended in 2011.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. Light is one type of _____ energy that is transmitted through space as a wave.
22. A(n) _____ is a unit of distance that is defined as the distance that light travels in one year.
23. _____ measures the number of wavelengths that pass a given point every second.
24. Radio telescopes collect and focus _____.
25. Bright and odd bodies that wander across the night sky were called _____ by the ancient Greeks.
26. _____ are patterns of stars in the sky.
27. A(n) _____ is any object that orbits a larger object.
28. Astronaut Neal Armstrong was the first human to step on the moon. It happened in July of _____.

29. A _____ is an unmanned spacecraft that is sent to collect data by flying near or landing on an object in space.
30. The Cassini mission has been studying the planet _____.

Short Answer

Answer each question in the space provided.

31. What are the limitations of Earth-based telescopes?

32. What are the advantages of a reflecting telescope?

33. What can an astronomer learn from the spectrum of a star?

Answer Key

1. b 2. d 3. a 4. a 5. b 6. c 7. d 8. d 9. a 10. b
11. true 12. false 13. true 14. true 15. false 16. false 17. false 18. true 19. false 20. true

21. electromagnetic (EM) radiation 22. light-year 23. frequency 24. radio waves 25. planets 26. constellations 27. satellite 28. 1969 29. space probe 30. Saturn

31. The atmosphere interferes with collection of electromagnetic radiation. The atmosphere blocks some radiation in the ultraviolet spectrum and almost all the radiation in the infrared spectrum. Motion in the atmosphere distorts light – causes the stars to twinkle.

32. Mirrors are lighter than lenses. Mirrors are easier to make precisely. Reflecting telescopes can be much larger than a refracting telescope. Larger telescopes collect more light and so they can see more distant objects.

33. How hot the star is, what elements the stars contain, whether and how fast the star is moving toward or away from Earth.}

CHAPTER

24**HS Earth, Moon, and Sun
Assessments****Chapter Outline**

- 24.1 PLANET EARTH**
 - 24.2 EARTH'S MOON**
 - 24.3 THE SUN**
 - 24.4 THE SUN AND THE EARTH-MOON SYSTEM**
 - 24.5 EARTH, MOON, AND SUN**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

24.1 Planet Earth

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. An imaginary line running through the poles of Earth is called
 - a. orbit
 - b. pole
 - c. magnetic pole
 - d. axis
2. At what speed does Earth revolve around the Sun?
 - a. 17 miles per second
 - b. 17 miles per hour
 - c. 1 mile per 17 seconds
 - d. 17 miles per day
3. Earth is divided into hemispheres, how many are there?
 - a. 2
 - b. 4
 - c. 6
 - d. 8
4. How long does it take the Earth to make one rotation on its axis?
 - a. one day
 - b. one month
 - c. one year
 - d. one week
5. How many degrees does the Earth turn in one day?
 - a. 90 degrees
 - b. 180 degrees
 - c. 360 degrees
 - d. 1080 degrees
6. One revolution of Earth is equal to what time span?
 - a. 1 day
 - b. 1 month
 - c. 1 year
 - d. 1 decade
7. What causes Earth's seasons?
 - a. it's rotation

- b. it's tilt
- c. it's revolution
- d. it's orbit

8. What is the shape of Earth?

- a. a sphere
- b. a sphere that bulges a bit at the poles
- c. a sphere that bulges a bit at the equator
- d. an egg

9. Earth's magnetic field is due to

- a. the convection of metal in Earth's inner core
- b. a bar magnet that is lodged between the magnetic poles
- c. the force of the Sun's magnetic field
- d. none of these

10. As Earth orbits the Sun it moves

- a. at the same speed all the time
- b. slower at aphelion and faster at perihelion
- c. faster at aphelion and slower at perihelion
- d. faster at sunspot maximum and slower at minimum

True or False

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

- _____ 11. Earth's orbit around the Sun is highly elliptical.
- _____ 12. We need to have leap year because Earth takes slightly more than 365 days to orbit the Sun.
- _____ 13. Earth's shape is called an oblate spheroid.
- _____ 14. The ancient Greeks knew that Earth was round.
- _____ 15. The Earth's crust is made up of about 75% iron which produces strong magnetic fields.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The portion of Earth between the equator and the South Pole is called the _____
17. Like Earth, the other planets of the solar system are _____
18. A(n) _____ is the division of a sphere into halves.
19. One _____ of earth is equal to one day.
20. Earth's path around the sun is in the shape of a(n) _____ .
21. The part of Earth that tilts toward the Sun in Southern Hemisphere summer is _____
22. $23\frac{1}{2}^{\circ}$ is Earth's _____
23. Earth makes one complete journey around the Sun in _____ days.

Short Answer

Answer each question in the space provided.

24. How does Foucault's pendulum show that Earth rotates on its axis?

25. What two lines of evidence that Earth is spherical did people have before spacecraft?

Answer Key

1. d 2. a 3. a 4. a 5. c 6. c 7. b 8. c 9. d 10. b

11. false 12. true 13. true 14. true 15. false

16. Southern Hemisphere 17. rotating spheres 18. hemisphere 19. rotation 20. ellipse 21. the South Pole 22. tilt 23. 365.24

24. Foucault strung a pendulum from a high ceiling. The ball swings back and forth over an octagon that is divided by lines and has numbers on it. Since a pendulum set in motion cannot change its direction and since the pendulum swings over different numbered lines over time that means that the lines must be moving so Earth must be moving.

25. During a lunar eclipse, Earth's shadow on the Moon is arc shaped. When you observe a ship going away from shore, it gets smaller but also the bottom of it disappears below the horizon and it appears to sink into the sea. }

24.2 Earth's Moon

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. How hot does the Moon get during the day?
 - a. 90°F
 - b. 121°F
 - c. 197°F
 - d. 225°F
2. How long does it take for the Moon to orbit Earth?
 - a. 1 day
 - b. 7.4 days
 - c. 19.2 days
 - d. 27.3 days
3. The thickness of the Moon's crust is _____ on the near side and _____ on the far side.
 - a. 60 km, 100 km
 - b. 100 km, 100 km
 - c. 60 km, 60 km
 - d. 100 km, 60 km
4. The dark areas on the Moon are referred to as "seas" because they are
 - a. ancient dried lake beds
 - b. dried ocean basins
 - c. basalt lavas
 - d. seawater
5. The lighter areas that can be seen on the Moon are called what?
 - a. maria
 - b. LOE
 - c. basins
 - d. terrae
6. What is the most dominant feature on the surface of the Moon?
 - a. volcanoes
 - b. craters
 - c. river basins
 - d. fault lines
7. Plate tectonics on the Moon
 - a. is very similar to plate tectonics on Earth

- b. ended very early in Earth history
 - c. is more rapid than on Earth
 - d. is nonexistent
8. What was happening on the Moon between about 3.0 to 3.5 billion years ago?
- a. volcanic activity due to plate tectonics
 - b. tremendous flooding
 - c. bombardment by meteorites
 - d. alien colonizations
9. Lunar temperatures are more extreme than Earth's because the Moon
- a. is closer to the Sun
 - b. rotates faster on its axis
 - c. doesn't have an atmosphere
 - d. has higher internal heat
10. Regarding their chemical composition, the Moon's crust and mantle are
- a. uniform in composition
 - b. very similar to Earth's crust and mantle
 - c. much more rich in lighter minerals
 - d. much more rich in darker minerals

True or False

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

- _____ 11. The Moon is the Earth's only natural satellite.
- _____ 12. Most of the maria are on the Moon's near side.
- _____ 13. The Moon has recorded some of the coldest temperatures in the entire solar system.
- _____ 14. There is no evidence of volcanic activities on the Moon, which explains why there are no mountain ranges on it.
- _____ 15. The Moon's internal structure is like Earth's the layers are just smaller.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. A smaller body that moves around a larger body in space is a(n) _____
17. Since the Moon's gravity is one-sixth Earth's, an astronaut could jump _____ times as high on the Moon.
18. A(n) _____ results from meteorite impacts on the surface of an object.
19. The lunar highlands are called _____.
20. The minerals of the terrae crystallized out of a(n) _____.
21. The dominant elements found in the Moon's crust are magnesium, aluminum, oxygen and _____.
22. The lunar crust is composed primarily of _____ rocks.
23. The Moon's mantle is made primarily of the minerals orthopyroxene and _____

Short Answer

Answer each question in the space provided.

24. What is the Moon's far side and why does it have one?

25. Describe the highlands and lowlands on the Moon and what made them that way.

Answer Key

1. d 2. d 3. a 4. c 5. d 6. b 7. d 8. c 9. c 10. b

11. true 12. true 13. true 14. false 15. true

16. satellite 17. six 18. crater 19. terrae 20. magma 21. silicon 22. igneous 23. olivine

24. The Moon rotates on its axis in the same amount of time it takes for it to orbit Earth so one side is always facing our planet. This means that we always see one

25. The lowlands are the maria; they are basalt lava that are dark in color and dense. The terrae make up the highlands, they are light silicate minerals that precipitated from a magma ocean. }

24.3 The Sun

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. About how long does it take sunlight to reach the Earth?
 - a. 8 seconds
 - b. 8 minutes
 - c. 8 hours
 - d. 8 days
2. How is helium made in the Sun's core?
 - a. nuclear fission
 - b. friction
 - c. nuclear fusion
 - d. decomposition
3. How long can solar prominences last?
 - a. up to 5 hours
 - b. up to 3 days
 - c. up to 8 days
 - d. up to several months
4. In the solar system, what percent of the mass is the Sun?
 - a. 50.3%
 - b. 67.8%
 - c. 94%
 - d. 99.8%
5. During a solar eclipse the part of the Sun that shows beyond the Moon is the
 - a. corona
 - b. photosphere
 - c. radiative zone
 - d. prominence zone
6. The Sun's central core is
 - a. plasma
 - b. molten metal
 - c. molten rock
 - d. photons
7. Which layer heats back up to 2 to 5 million°C
 - a. core

- b. corona
 - c. chromosphere
 - d. photosphere
8. Which layer of the Sun contains photons that move extremely slow?
- a. corona
 - b. core
 - c. radiative zone
 - d. convection zone
9. Most atoms in the Sun exist as
- a. photons
 - b. plasma
 - c. light
 - d. silicate minerals
10. The energy that powers the Sun comes from
- a. hydrogen fusing to form helium
 - b. radioactivity
 - c. helium fusing into heavier elements
 - d. nuclear fission
11. Where loops of the Sun's magnetic field disrupt the Sun's heat, there are
- a. solar flares
 - b. solar prominences
 - c. sunspots
 - d. solar winds
12. Hot material rises and then plunges back downward in the
- a. radiative zone
 - b. corona
 - c. convective zone
 - d. chromosphere

True or False

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

- _____ 13. Because of the extensive heat, the energy released in the core travels rapidly through the radiative zone.
- _____ 14. A solar flare can knock out power grids on Earth.
- _____ 15. The Sun has by far, the greatest mass in the solar system.
- _____ 16. The layers of the Sun are unidentifiable, because the Sun is not a solid.
- _____ 17. Plasma is a solid.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A(n) _____ is a plasma loop flowing between sunspots.
19. Energy moves from atom to atom as electromagnetic waves in the _____ of the Sun.
20. The _____ is the visible surface of the Sun.
21. Energy moves as flowing cells of gas in the _____ of the Sun.
22. _____ is matter where the electrons are stripped away from the atoms.

23. Sunspots occur in cycles lasting _____ years.
24. The Sun is composed entirely of the elements _____ and _____.
25. Highly energetic particles from a solar flare or coronal mass ejection make up the _____

Short Answer

Answer each question in the space provided.

26. Draw and label the layers of the Sun.

27. How does energy move through the radiative zone?

Answer Key

1. b 2. c 3. d 4. d 5. b 6. a 7. c 8. b 9. b 10. a 11. c 12. a
13. false 14. true 15. true 16. false 17. false
18. solar prominence 19. radiative zone 20. photosphere 21. convection zone 22. Plasma 23. 11 24. hydrogen, helium 25. solar wind
26. See section "Layers of the Sun" in text.
27. Energy from the core moves slowly through the radiative zone. A particle of light called a photon travels only a few millimeters before it hits another particle. The photon is absorbed and then released again. It takes an incredible amount of time, as much as 50 million years, to travel through the radiative zone.}

24.4 The Sun and the Earth-Moon System

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. At what tilt of Earth would the seasons be most extreme at the poles?
 - a. 0 degrees
 - b. 25 degrees
 - c. 55 degrees
 - d. 90 degrees
2. In which month does the summer solstice occur?
 - a. January
 - b. December
 - c. July
 - d. June
3. The Sun moves which way across the sky?
 - a. North to South
 - b. West to East
 - c. East to West
 - d. South to North
4. Two times during the year, the Sun is directly over the equator. What are these times called?
 - a. equinoxes
 - b. solstices
 - c. eclipses
 - d. capricorn and cancer
5. What are the two distinct parts of Earth's shadow during a solar eclipse?
 - a. light and dark
 - b. umbra and penumbra
 - c. panera and umbrella
 - d. inner and outer
6. If the Moon is more than half lit, but the left side is unlit, the phase is
 - a. first quarter
 - b. waxing gibbous
 - c. waning gibbous
 - d. last quarter
7. When the Earth and Sun are in line but the Moon is perpendicular to the Earth, what type of tide occurs?
 - a. neap tide

- b. spring tide
 - c. null tide
 - d. waning tide
8. When the full moon moves through Earth's shadow, what occurs?
- a. solar eclipse
 - b. high tide
 - c. low tide
 - d. lunar eclipse
9. Summer days are longer and nights are shorter
- a. everywhere on Earth
 - b. most distinctly toward the poles
 - c. most distinctly at the equator
 - d. none of these
10. You know that Earth is not closer to the Sun in the summer because
- a. it is winter in the Southern Hemisphere.
 - b. it is summer in the Southern Hemisphere.
 - c. Earth is always the same distance from the Sun.
 - d. none of these.
11. A lunar eclipses lasts for
- a. hours as the Moon passes through Earth's penumbra.
 - b. minutes as the Moon passes through Earth's shadow.
 - c. hours as the Moon passes through Earth's umbra.
 - d. none of these.
12. The Sun's effect on tides is smaller because
- a. being gaseous the Sun has a smaller gravitational pull
 - b. the Moon is so much larger
 - c. the Sun is so much farther away
 - d. the Sun's effect is cancelled out by the Moons.

True or False

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

- _____ 13. A lunar eclipse generally lasts between 5-10 minutes.
- _____ 14. Birds may become confused during a lunar eclipse and think that it is nighttime.
- _____ 15. Earth's rotation means that there is a cycle of daylight and darkness approximately every 24 hours.
- _____ 16 The seasons are caused by the tilt of Earth's axis of rotation relative to its plane of orbit around the Moon.
- _____ 17. A shadow on the Earth and blocks Earth's view of the Sun during a solar eclipse.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A(n) _____ moon is when the moon is 51 – 99% full.
19. A(n) _____ is the outer part of the shadow that remains partially lit during an eclipse.
20. A(n) _____ is when the Moon falls into the shadow of the Earth.
21. The amount of time it takes for Earth to rotate once on its axis is _____

22. When the Moon is half lit we call it a _____ moon.
23. If the Moon is between Earth and Sun and the nearside is dark, it is a(n) _____
24. The moon is less than half lit during its _____ phase.
25. The time between two full moon phases is _____ .

Short Answer

Answer each question in the space provided.

26. Describe the positions of the Sun and Moon during spring tides. Describe what happens to water levels during spring tides.

27. Imagine that you live along the Tropic of Cancer. What is the position of your home relative to the Sun at summer solstice, winter solstice and at the equinoxes? Talk about this in terms of Earth's tilt.

Answer Key

1. d 2. d 3. c 4. a 5. b 6. b 7. b 8. d 9. b 10. a 11. c 12. c
13. false 14. false 15. true 16. true 17. true
18. gibbous 19. penumbra 20. lunar eclipse 21. 24 hours 22. quarter 23. new moon 24. crescent 25. 29.5 days
26. During spring tides, the Sun and Moon are on the same side or exactly opposite sides of Earth so that the tides caused by the Sun and Moon add together to create really high or really low tides. This large tidal range is a spring tide and they occur every full and new moon. During spring tides, the highs are really high and the lows are really low.
27. At summer solstice the Sun is directly overhead. Earth is tilted so that the North Pole is pointing toward the Sun. This is the largest tilt that will occur during the year. At winter solstice, the South Pole is pointing toward the Sun and my home is tilted as far from the sun as it will be. At the equinoxes, the Sun is directly overhead at the equator so there is no tilt. }

24.5 Earth, Moon, and Sun

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which of the following is the actual shape of the Earth?
 - a. spherical
 - b. oblate spheroid
 - c. egg-shaped
 - d. oval
2. The spinning motion of Earth on its _____, which creates an Earth _____.
 - a. rotation; year
 - b. revolution; day
 - c. rotation; day
 - d. revolution; year
3. Why does the Earth have seasons?
 - a. its tilt
 - b. its elliptical orbit
 - c. its rotation
 - d. its magnetic field
4. The weather on the Moon is
 - a. extremely hot, but calm.
 - b. variable.
 - c. hot and cold, and stormy.
 - d. nonexistent.
5. Water on the Moon is found as
 - a. vapor in the atmosphere
 - b. liquid in soil
 - c. ice in deep craters
 - d. vapor, liquid and ice like on Earth
6. We only see one side of the Moon because
 - a. when the far side faces us it is a new moon and it is dark.
 - b. the far side faces us only at night.
 - c. one rotation and one revolution take the same amount of time.
 - d. none of these
7. What is the visible surface of the sun?
 - a. photosphere

- b. chromosphere
 - c. corona
 - d. none of the above
8. The convection of molten metal in Earth's outer core results in
- a. plate tectonic motions
 - b. volcanism
 - c. the auroras
 - d. the magnetic field
9. Solar flares
- a. they release large amounts of radiation.
 - b. can knock out entire power grids.
 - c. can knock out communications.
 - d. All of the above.
10. The geology of the Moon can be described as
- a. light colored minerals that crystallized from a magma ocean.
 - b. dark colored basalts that erupted from magma produced by mantle convection.
 - c. craters formed from volcanic eruptions.
 - d. all of these.

True or False

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

- _____ 11. Earth's magnetic field acts like a giant bar magnet.
- _____ 12. Earth's orbital path is an ellipse.
- _____ 13. Earth's orbit causes its seasons.
- _____ 14. The Moon is Earth's only natural satellite.
- _____ 15. The chromosphere is much hotter than the photosphere.
- _____ 16. Solar prominences are only visible during a total eclipse.
- _____ 17. The summer solstice occurs on July 21.
- _____ 18. A lunar eclipse occurs when a full moon moves through the Earth's shadow.
- _____ 19. Flat areas of basaltic rock are characteristic of the terrae areas of the Moon.
- _____ 20. During the crescent moon phase, the moon is seen as a sliver.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. The closest the Earth gets to the sun each year is called the _____ on about January 3rd and the farthest is called the _____ on July 4th.
22. The Moon's surface has been altered tremendously by the _____ left by meteorite impacts.
23. The lunar maria are made of _____.
24. The fourth state of matter made up of superheated gas with a positive electrical charge is called _____.
25. _____ are cooler, darker areas on the Sun.
26. _____ are violent eruptions that release huge amounts of energy.
27. _____ are areas that occur when an object obstructs a light source so that the darkness takes the shape of the object.

28. A _____ occurs when the new moon passes directly between the Earth and the Sun.
29. Earth's shadow has two distinct parts: the _____ and _____.
30. Earth's _____ shields the planet from harmful solar radiation.

Short Answer

Answer each question in the space provided.

31. Describe the internal structure of a star.

32. What creates sunspots?

33. What is the difference between neap tides and spring tides?

Answer Key

1. b 2. c 3. a 4. d 5. c 6. c 7. a 8. d 9. d 10. a
11. true 12. true 13. false 14. true 15. true 16. false 17. false 18. true 19. false 20. true

21. perihelion; aphelion 22. craters 23. basalt 24. plasma 25. sunspots 26. solar flares 27. shadows 28. solar eclipse 29. umbra; penumbra 30. magnetic field

31. The core is plasma with a temperature of 27 million °C. The radiative zone, just outside the core, has a temperature of 7 million °C. The convective zone, outside the radiative zone, is where convection occurs

32. Sunspots occur where loops of the Sun's magnetic field breaks through the surface and disrupts the smooth transfer of heat from lower layers of the Sun, making them cooler and darker and marked by intense magnetic activity.

33. Spring tides occur when the solar and lunar tides align, at the new and full moons. This is when the tidal gradient is largest. At the first and quarter moons, the solar tide and lunar tide interfere with each other, producing lower than normal tides called neap tides. }

CHAPTER

25

HS The Solar System Assessments

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**
 - 25.5 THE SOLAR SYSTEM**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

25.1 Introduction to the Solar System

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. In the geocentric model of the universe objects in the sky are
 - a. in layered spheres with the Sun at the center
 - b. attached to the stars of the firmament
 - c. making elliptical orbits around Earth
 - d. in layered spheres with the Sun in the fourth sphere
2. Viewed from Earth the planets move
 - a. in the same direction as the stars
 - b. sometimes with and sometimes opposite the stars
 - c. some with and some against the stars
 - d. in a circular motion
3. The first evidence that objects could orbit something besides Earth came from observations of
 - a. the Galilean moons.
 - b. Saturn's rings.
 - c. the phases of Venus.
 - d. planetary epicycles.
4. The heliocentric model of the solar system was
 - a. invented by Aristotle and other Greek philosophers.
 - b. described by Copernicus and supported by Galileo.
 - c. invented by Galileo.
 - d. invented by Ptolemy and supported by Aristotle.
5. Extrasolar planets are found by
 - a. detecting the star's radial velocity due to the planet's gravitational pull.
 - b. a temporary, periodic dimming in the star's brightness as the planet moves in front of it.
 - c. direct imaging
 - d. all of these
6. Why is a day on Mercury equal to 57 Earth days?
 - a. Mercury rotates very slowly on its axis
 - b. Mercury revolves very slowly around the Sun
 - c. Venus has a gravitational pull on Mercury
 - d. On Mercury, the time for one revolution is the same as for one rotation
7. The force of gravity between objects depends on their _____ and _____
 - a. volume; their acceleration

- b. mass; the distance between them
 - c. size; their gravitational potential energy
 - d. density; kinetic energy
8. Galileo's discovery that Venus has phases was important because it provided evidence that Venus
- a. orbits the Sun
 - b. orbits Earth
 - c. has at least one moon
 - d. orbits the Sun more quickly than does Earth
9. Features of the solar system include that
- a. all planets lie in the same plane
 - b. most planets orbit the Sun in the same direction
 - c. all planets rotate in the same direction
 - d. all of these
10. Material in the nebula was drawn together by gravity, which released _____ energy; small particles collided to create large particles, which released _____ energy.
- a. gravitational; potential
 - b. gravitational potential; potential
 - c. gravitational potential; kinetic
 - d. gravitational; kinetic
11. The cloud that was the nebula began to spin as it collapsed due to
- a. gravity
 - b. gravitational potential energy
 - c. angular momentum
 - d. kinetic energy
12. The inner planets and outer planets are, in order from the Sun
- a. inner: Venus, Mercury, Mars, Earth; outer: Saturn, Jupiter, Neptune, Uranus
 - b. inner: Mars, Venus, Earth, Mercury; outer: Saturn, Uranus, Jupiter, Neptune
 - c. inner: Earth, Mercury, Venus, Mars; outer: Saturn, Uranus, Neptune, Jupiter
 - d. inner: Mercury, Venus, Earth, Mars; outer: Jupiter, Saturn, Uranus, Neptune

True or False

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

- _____ 13. If you know a planet's orbit you can determine its distance from the Sun.
- _____ 14. Copernicus' model has a problem because he thought that the planets moved in circular orbits.
- _____ 15. The orbits of the planets are quite elliptical.
- _____ 16. One astronomical unit is the distance from Earth to Sun, or 150 million km.
- _____ 17. All of the planets in the solar system rotate in the same direction.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The widely accepted explanation for how the solar system formed is the _____.
19. We currently accept the _____ model of the universe.
20. After the Sun, the largest object in the solar system is _____.
21. Ptolemy thought that the _____ was at the center of the universe.

22. As of 2006, Pluto has been classified as a(n) _____.
23. To form the planets, gravity brought together clumps of matter to make _____.
24. The axis of rotation for all of the planets is roughly _____ to the orbital plane.
25. The oldest moon rocks are _____ years old.

Short Answer

Answer each question in the space provided.

26. What is the composition of the outer versus the inner planets? Why is this the case?

27. How did the Sun form from the solar nebula?

Answer Key

1. d 2. b 3. a 4. b 5. d 6. a 7. b 8. a 9. a 10. c 11. c 12. d
13. true 14. true 15. false 16. true 17. false
18. nebular hypothesis 19. heliocentric 20. Jupiter 21. Earth 22. dwarf planet 23. planetesimals 24. perpendicular
25. 4.5 billion
26. Gravitational sorting pulled the denser materials from the solar nebula, rock and metal, toward the center. The lighter materials, the gases such as hydrogen, helium, water, ammonia and methane, stayed further out. So when the planets formed the inner planets were made of rock and metal and the outer planets were made of gases.
27. Gravity pulled matter into the center of the disk. The center became dense and pressure was high. When the pressure was high enough nuclear fusion began. The burning star kept the Sun from collapsing further. }

25.2 Inner Planets

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A day is
 - a. the time it takes for a planet to rotate once on its axis
 - b. the time it takes for Earth to rotate once on its axis
 - c. the time it takes for a planet to go around the Sun once
 - d. the time it takes for the Sun to rotate once on its axis
2. Why does Mars appear red?
 - a. blood from many Martian wars
 - b. iron oxide in the soil
 - c. lava flowing across the surface
 - d. large storms
3. The number of impact craters on Mercury means that the planet is
 - a. too close to the Sun to be hit much by meteorites
 - b. continually being resurfaced by volcanism
 - c. not geologically active
 - d. subject to constant storms
4. Olympus Mons, the largest volcano in the solar system, is on the planet _____ and is a _____ - volcano.
 - a. Mars; composite
 - b. Mars; shield
 - c. Venus; composite
 - d. Venus; shield
5. Regarding life on the inner planets:
 - a. Earth has a lot of biodiversity
 - b. Venus is thought to have microbes beneath its thick atmosphere
 - c. Mars has fossil microbes so life existed there at some time
 - d. all of these
6. Why is Venus the hottest planet?
 - a. It is closest to the Sun
 - b. It has a powerful greenhouse effect.
 - c. It has the most internal heat
 - d. It spins the fastest.
7. Large volcanoes surrounded by plains of lava describes the surface of

- a. Mercury
 - b. Venus
 - c. Earth
 - d. Mars
8. Which planet has an atmosphere that is thin, mostly carbon dioxide, but with only a small greenhouse effect?
- a. Mercury
 - b. Venus
 - c. Earth
 - d. Mars
9. What is the atmosphere of Venus made of?
- a. nitrogen and oxygen, with some carbon dioxide
 - b. sulfur dioxide and methane
 - c. carbon dioxide, with some sulfur dioxide
 - d. methane and ammonia
10. How can planetary scientists tell that volcanoes on a planet are caused by plate tectonics?
- a. They are covered by lots of craters.
 - b. They are very large and tall.
 - c. They line up like at plate boundaries.
 - d. none of these
11. Evidence for liquid water in the Martian past include
- a. water-eroded canyons
 - b. crystals known to precipitate from water
 - c. the presence of polar ice currently
 - d. all of these
12. Regarding the atmosphere of the inner planets
- a. Earth has the most greenhouse effect
 - b. Mars has the thickest
 - c. Venus and Mercury are very similar
 - d. none of these

True or False

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

- _____ 13. All of the inner planets were geologically active at some time in their history.
- _____ 14. It takes Earth 365.24 days to orbit the Sun.
- _____ 15. Besides Earth, the only inner planet with a large moon is Venus.
- _____ 16. Except Earth, the inner planets are all solid throughout.
- _____ 17. The inner planets spin faster and have shorter orbits around the Sun than the outer planets.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. One _____ equals one rotation of the Earth on its axis.
19. The main rock type of the inner planets is _____.
20. The deepest canyon in the solar system is on the planet _____.
21. Because the planets nearest the Sun are rocky, they are called the _____ planets.

22. The planet most similar to Earth in size and density is _____.
23. The planet in our sky that rises and sets very near to the Sun is _____.
24. The planet with the most volcanoes is _____.
25. Mercury has _____ (short, long) days and (short, long) years.

Short Answer

Answer each question in the space provided.

26. If humans wanted to build a colony on another planet, which should they choose and why?

27. Venus has a small number of impact craters. Mars has more than Earth but less than the Moon. What does this mean about the geologic processes of each of these four planetary bodies?

Answer Key

1. a 2. b 3. c 4. b 5. a 6. b 7. d 8. d 9. c 10. c 11. d 12. d
13. true 14. true 15. false 16. false 17. false
18. day 19. igneous 20. Mars 21. terrestrial 22. Venus 23. Venus 24. Venus 25. long, short
26. The two nearest are Venus and Mars. Venus is much too hot and the atmospheric pressure is crushing. Mars is by far the most Earth-like, even though it has very little atmosphere. Temperatures wouldn't be too bad and there is some water ice that could be harvested.
27. Moon is geologically dead with no plate tectonics and no atmosphere so it has all of the impact craters it has ever gotten. Venus and Mars have a small number. They have a lot of internal heat that builds up and generates volcanism, which has erased many of the craters that they have gotten. Atmospheric processes have erased some of them as well, especially on Venus. Earth has both plate tectonics and erosional forces so very few impact craters survive. }

25.3 Outer Planets

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. How long does it take Jupiter to revolve around the Sun?
 - a. 1 Earth year
 - b. 5 Earth years
 - c. 9 Earth years
 - d. 12 Earth years
2. How long does it take light from the Sun to reach Uranus?
 - a. 5 days
 - b. 1 minute
 - c. 2 hours and 40 minutes
 - d. 3 days and 4 hours
3. When Galileo looked through his telescope he saw
 - a. four moon of Jupiter
 - b. four moons of Saturn
 - c. Neptune and Uranus' rings
 - d. all of these
4. Europa seems to be liquid beneath its surface ice because it is heated by
 - a. radioactive decay.
 - b. its molten core.
 - c. the Sun.
 - d. the intense gravitational pull of Jupiter.
5. What explains the existence of Saturn's rings?
 - a. They are ice that has been flung out from the planet.
 - b. They are material from a moon that broke into pieces.
 - c. They are rocks that have been flung out from the planet.
 - d. No one has any idea.
6. What is the Giant Red Spot?
 - a. A giant storm on Jupiter
 - b. Mars
 - c. A an enormous volcano on Neptune
 - d. The outermost ring on Saturn
7. Which moon of Saturn highly resembles early Earth?
 - a. Cassini

- b. Galileo
- c. Titan
- d. Thor

8. Neptune was discovered

- a. because there was a gravitational pull affecting Uranus' orbit
- b. by accident through a telescope
- c. by the Hubble Space telescope
- d. it wanders across the sky like the other planets

9. Neptune's appearance is always changing because

- a. its temperature rises above and falls below the freezing point of water.
- b. its dark spots are on an 11-year cycle
- c. it has strong seasons
- d. it has an extremely turbulent atmosphere

10. Uranus and Neptune appear blue because

- a. they are composed of solid water ice
- b. their methane filters out red light
- c. they are covered by blue oceans
- d. they are covered by blue algae

True or False

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

- _____ 11. The Great Dark Spot on Neptune has existed at least since the planet was first observed.
- _____ 12. Most moons in the solar system are captured asteroids.
- _____ 13. Jupiter's four largest moons are larger than the dwarf planet Pluto.
- _____ 14. Astronauts have brought back samples from Europa so they can test for signs extraterrestrial life.
- _____ 15. Saturn is unique because it is the only planet with rings.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The planet that is tilted on its side is _____.
17. The four largest moons of Jupiter are known as _____.
18. The planets beyond the asteroid belt are known as the _____.
19. The planet that is less dense than water is _____.
20. The liquid on Europa is probably mostly _____.
21. Besides four moons, when Galileo looked through his telescope he saw _____.
22. Plate tectonics, in which the plates are ice sheets, may be occurring on _____.
23. Jupiter is made mostly of _____ with some helium and methane.

Short Answer

Answer each question in the space provided.

24. Why are the outer planets made primarily of hydrogen and helium, but not the inner planets?

25. What is Titan and why is it especially interesting?

Answer Key

1. d 2. c 3. a 4. d 5. b 6. a 7. c 8. a 9. d 10. b

11. false 12. true 13. true 14. false 15. false

16. Uranus 17. Galilean moons 18. outer planets or gas giants 19. Saturn 20. water 21. the Great Red Spot 22. Europa 23. hydrogen

24. The early solar system was made mostly of hydrogen and helium when it formed. The inner planets did not have enough mass to hold these light gases and they floated into space. The Sun and the massive outer planets could keep their hydrogen and helium with their gravity.

25. Titan is Saturn's largest moon, 1.5 times the size of Earth's Moon; even larger than Mercury. Its atmosphere is similar to that of the early Earth before life developed. Titan may have liquid water and ammonia under its surface ice and there is a small chance that there is life in that liquid. However, compared with the early Earth, it is extremely cold and has no carbon dioxide. }

25.4 Other Objects in the Solar System

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

- When the solar system formed, most of the matter became
 - asteroids and comets
 - planets
 - part of the Sun
 - space dust
- Near-Earth asteroids
 - have orbits that cross Earth's
 - number more than 4,500
 - could strike Earth at any time
 - all of these
- Halley's Comet was seen most recently in 1985-1986. When is it expected to return?
 - 2030
 - 2061
 - 2092
 - 2185
- What could Pluto-Charon be classified as?
 - two asteroids
 - a planet and a moon
 - a double dwarf planet
 - a planet and a dwarf planet
- The asteroid belt is located between which two planets?
 - Earth Mars
 - Mars Jupiter
 - Jupiter Neptune
 - Mercury Venus
- Scientists value meteorites because they
 - are material from the earliest solar system
 - are an important source of valuable metals
 - contain metals not otherwise found on Earth
 - none of these
- Pluto needed to be reclassified because
 - it was struck by a large asteroid and got smaller

- b. technology discovered a lot about Pluto and other solar system objects
 - c. astronomers wanted to have eight planets-four inner, four outer
 - d. astronomers needed something to do
8. The asteroid belt probably represents debris that
- a. was a large planet that was broken apart by an asteroid impact.
 - b. could strike Earth at any time
 - c. couldn't form a planet due to Jupiter's gravity.
 - d. none of these
9. A planet cannot be part of the asteroid belt because a planet
- a. has a different orbit from the asteroids in the belt
 - b. is rounded
 - c. clears its space of debris like asteroids
 - d. is too large to be in the asteroid belt
10. Where do shorter period comets come from?
- a. the Kuiper belt
 - b. other solar systems
 - c. the Moon
 - d. the asteroid belt
11. Which of the following are dwarf planets?
- a. Pluto
 - b. Eris
 - c. Makemake
 - d. all of the above
12. Why is the dwarf planet Ceres not classified as a large asteroid?
- a. it is rounded
 - b. it is too large
 - c. it does not have craters
 - d. it is a moon of Pluto

True or False

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

- _____ 13. All shooting stars strike the ground and become meteorites.
- _____ 14. Comet orbits are similar in shape to planet orbits.
- _____ 15. The longest period comets come from the Kuiper belt cloud.
- _____ 16. Any object whose orbit crosses Earth's can collide with Earth.
- _____ 17. What Pluto's discoverer thought was the single planet was really two bodies, Pluto and Charon.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. The scientific term for a shooting star is a(n) _____.
19. When a space rock strikes Earth, it is a(n) _____.
20. A rocky body that has not yet entered Earth's atmosphere is a(n) _____.
21. Small rocky bodies that orbit the Sun are _____.
22. Pluto's orbit is located in in the _____.

23. If you wanted to learn about the Oort cloud, you would study _____.
24. Comet Hale-Bopp of 1997 had two tails, one of dust and one of _____.
25. When Earth passes through an old comet tail we experience a(n) _____.

Short Answer

Answer each question in the space provided.

26. Why do comets have tails?

27. Why is Pluto a dwarf planet, but not a planet any more?

Answer Key

1. c 2. d 3. b 4. c 5. b 6. a 7. b 8. c 9. c 10. a 11. d 12. a
13. false 14. false 15. false 16. true 17. true
18. meteor 19. meteorite 20. asteroid 21. asteroid 22. Kuiper belt 23. long-period comets 24. ions 25. meteor shower
26. Comet ice vaporizes as the comet flies close to the Sun and reflects sunlight. This forms a glowing coma. Radiation and particles streaming from the Sun push the gas and dust into a long tail that always points away from the Sun.
27. Both a planet and a dwarf planet must be a nearly spherical body that is not a star, but that orbits a star. A planet must have cleared its area of smaller objects, but a dwarf planet must not have done that. Pluto has not done that. }

25.5 The Solar System

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Copernicus' model of the solar system got better when
 - a. Earth was placed at the center
 - b. Kepler determined that planets move in ellipses
 - c. Galileo discovered galaxies
 - d. none of these
2. Who proposed the heliocentric model of the universe?
 - a. Galileo
 - b. Kepler
 - c. Ptolemy
 - d. Copernicus
3. Galileo's telescope helped the Copernican model by showing that
 - a. Venus orbits the Sun
 - b. moons orbit Mars
 - c. planets have elliptical orbits
 - d. all of these
4. Which planet has the longest year?
 - a. Jupiter
 - b. Saturn
 - c. Uranus
 - d. Neptune
5. If you know a planet's orbital period you can determine its
 - a. composition
 - b. age
 - c. distance from the Sun
 - d. rotation rate
6. The asteroid belt is most likely
 - a. a failed planet
 - b. a large planet that broke apart
 - c. something that formed at the beginning of the solar system
 - d. no one knows
7. All of the outer planets are primarily composed of what elements?
 - a. hydrogen and helium

- b. hydrogen and carbon
 - c. carbon and neon
 - d. lithium and carbon
8. Jupiter has
- a. exactly the composition of the Sun.
 - b. a storm that has been active for at least 300 years
 - c. a total of four moons
 - d. all of these
9. How long does it take the Earth to revolve around the Sun?
- a. 29.5 days
 - b. 24 hours
 - c. 365.24 days
 - d. 1 month
10. The most likely place for life to be found elsewhere in the solar system is
- a. the surface of Venus
 - b. the Great Dark Spot of Neptune
 - c. the moon of a gas giant
 - d. nowhere. There is no chance of finding extraterrestrial life in the solar system.

True or False

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

- _____ 11. Neither the Earth nor our Sun is at the center of the universe.
- _____ 12. More than a million exoplanets have been identified.
- _____ 13. Mars is the only planet in the solar system besides Earth that has liquid water.
- _____ 14. A day is longer than a year on Venus.
- _____ 15. The outer planets all have a lot of weather.
- _____ 16. Mars is red due large amounts of iron oxide in the soil.
- _____ 17. In the geocentric model the planets and stars are in spheres around Earth.
- _____ 18. Saturn is the only planet with rings.
- _____ 19. Saturn's rings probably formed from the breakup of one of its moons.
- _____ 20. Neptune was knocked sideways by a collision with a giant asteroid.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. The model that the Sun is the center of the universe is called the _____ model.
22. A _____ is a giant cloud of gas and dust.
23. The thick clouds of Venus create this climate phenomenon: _____.
24. The only inner planet with a large natural satellite is _____.
25. The possibility of a liquid water ocean on _____ make it a candidate to look for extraterrestrial life.
26. Scientist are interested in Saturn's moon, _____, because it is similar to what Earth was like before life developed.
27. Uranus and Neptune are blue due to _____.

28. _____ is also known as the morning star and the evening star.
29. Bodies that move forward across the sky, then reverse, then move forward again are _____
30. Small, icy objects that have very elliptical orbits around the Sun are called _____.

Short Answer

Answer each question in the space provided.

31. How do scientists discover extrasolar planets?
32. What observations did the nebular hypothesis need to explain about the solar system?
33. What information do meteorites contain and why are they so valuable to scientists?

Answer Key

1. b 2. d 3. a 4. d 5. c 6. a 7. a 8. b 9. c 10. c
11. true 12. false 13. false 14. true 15. true 16. true 17. true 18. false 19. true 20. false

21. heliocentric 22. nebula 23. greenhouse effect 24. Earth 25. Europa 26. Titan 27. methane 28. Venus 29. planets 30. comets

31. Some have been directly imaged but most have found through indirect methods. Indirect methods include: 1) detecting the very slight motion of a star caused by the gravitational pull of a planet or another star orbiting the star, 2) measuring a star's brightness over time - a temporary decrease when a planet transits the star it is orbiting.

32. The nebular hypothesis was designed to explain some of the basic features of the solar system:

- The orbits of the planets lie in nearly the same plane with the Sun at the center
- The planets revolve in the same direction
- The planets mostly rotate in the same direction
- The axes of rotation of the planets are mostly nearly perpendicular to the orbital plane
- The oldest moon rocks are 4.5 billion years

33. Meteorites represent the material of the early solar system. Parts of planets that we can't get to, such as their cores, can become meteorites. They are especially valuable because they are just lying around on Earth and so don't cost much to acquire compared with other ways of getting space rocks. }

CHAPTER

26**HS Stars, Galaxies, and the
Universe Assessments****Chapter Outline**

- 26.1 STARS**
 - 26.2 GALAXIES**
 - 26.3 THE UNIVERSE**
 - 26.4 STARS, GALAXIES, AND THE UNIVERSE**
-

- The answer keys can be found in the Resource tab above the Table of Contents.

26.1 Stars

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

- Scientists collide particles in particle accelerators to
 - simulate the conditions of the birth of the universe.
 - simulate nuclear fusion in a star's core.
 - fuse subatomic particles.
 - all of these
- To classify a star by color and temperature:
 - the hottest are red; the coolest are blue-white
 - yellow stars like our Sun are hottest
 - the hottest are blue; the coolest are red
 - the hottest are white; the coolest are red
- The more massive a main sequence star, the _____ its temperature because _____
 - higher; it burns heavier elements, which burn hotter
 - lower; the nuclear fusion is deeper in the star
 - lower; it burns heavier elements, which burn cooler
 - higher; it must burn more hydrogen to keep from collapsing
- The energy emitted from stars is in the form of
 - neutrino streams
 - electromagnetic radiation
 - radio waves
 - solar wind
- How are stars classified?
 - color and luminosity
 - color and size
 - size only
 - age and size
- When a mid-size star, like our Sun, becomes a _____ and then stops fusion it becomes a(n) _____ and then eventually _____.
 - red giant; white dwarf; fades out
 - red giant; red supergiant; explodes as a supernova
 - blue dwarf; white dwarf; supernova
 - blue giant; blue dwarf; fades out
- What can't escape a black hole?

- a. light
 - b. mass
 - c. matter
 - d. all of the above
8. What cloud formation are stars born in?
- a. nursery
 - b. nebula
 - c. Oort cloud
 - d. Kuiper belt
9. What is the energy source for all stars?
- a. nuclear fusion
 - b. nuclear fission
 - c. solar
 - d. hydrothermal
10. Energy production in a star takes place in the
- a. convective zone
 - b. core
 - c. radiative zone
 - d. corona
11. If you watch the sky for a while you can tell the brightest star Sirius from a bright planet because
- a. they are different colors
 - b. the planet exhibits retrograde motion
 - c. Sirius is an obvious binary star
 - d. Sirius appears much larger than any planet
12. The neutrons in a neutron star form when density becomes so immense that
- a. protons and electrons fly off.
 - b. neutrinos fuse together.
 - c. protons and electrons fuse together.
 - d. none of these

True or False

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

- _____ 13. The energy source for all stars is nuclear fusion.
- _____ 14. Stars emit energy out into space as electromagnetic radiation.
- _____ 15. Our Sun is about half way through its life span.
- _____ 16. A black hole emits dark electromagnetic radiation that we can't see.
- _____ 17. A person living in Colorado would continue to see the same constellations, in the same location year-round.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. A small to mid-sized star that has collapsed is called a(n) _____.
19. A(n) _____ can only be seen indirectly, since it emits no light.
20. An explosion of a red giant star results in a(n) _____.

21. In the core of the Sun, many _____ occur creating large amounts of energy.
22. While from a distance it may appear as one star, a group of stars that appear in close proximity is known as a(n) _____.
23. Astronomers can calculate the distance to a star by observing its _____.
24. For a star to become a neutron star it must have at least _____ solar masses.
25. A star is in this life stages when it is fusing hydrogen into helium: _____.

Short Answer

Answer each question in the space provided.

26. How do the elements heavier than helium form?
27. What is a black hole? How do astronomers locate them?

Answer Key

1. d 2. c 3. d 4. b 5. a 6. a 7. d 8. a 9. a 10. b 11. b 12. c
13. true 14. true 15. true 16. false 17. true
18. white dwarf 19. black hole 20. supernova 21. nuclear fusion reactions 22. asterism 23. parallax 24. four 25. main sequence
26. In a red supergiant star, fusion continues after the helium is used up to create the elements up to iron. When there are no more elements for the star to fuse, gravity pulls it in and it explodes in a violent supernova. There is so much energy that atoms fuse to produce the heavier elements.
27. A black hole is what remains after a supernova explosion of a star that was more than five times the mass of the Sun. Black holes have so much gravity that not even light can escape. A black hole can be identified because its gravity affects objects around it and radiation leaks out its edges. }

26.2 Galaxies

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A galaxy can contain how many stars?
 - a. up to 500
 - b. up to 30,000
 - c. up to 10 million
 - d. up to many billions
2. How are irregular galaxies shapes formed?
 - a. collisions with other galaxies
 - b. gravitational pull from other galaxies
 - c. a b
 - d. none of the above
3. How wide is the central bulge of the Milky Way?
 - a. 1,000 - 6,000 light years
 - b. 1 light year
 - c. 100 light years wide
 - d. 12,000 - 16,000 light years
4. Open clusters
 - a. are stars that formed from the same nebula
 - b. usually contain a small number of stars, like the Seven Sisters
 - c. are only visible through a telescope
 - d. all of these
5. What are stars that are grouped closely together called?
 - a. star systems
 - b. similar systems
 - c. star partners
 - d. star neighbors
6. What type of galaxy is the Milky Way Galaxy?
 - a. spiral galaxy
 - b. elliptical galaxy
 - c. irregular galaxy
 - d. none of the above
7. Spiral galaxies have
 - a. lots of young stars

- b. lots of blue stars
 - c. lots of dust and gas
 - d. all of these
8. Most elliptical galaxies have very little gas and dust because
- a. they are very young
 - b. the dust and gas have already formed stars
 - c. the dust and gas is pulled into supermassive black holes at the center
 - d. none of these
9. The evidence that the Milky Way is a spiral galaxy includes
- a. the spiral arms that we can see from space telescopes
 - b. the velocities of stars that show rotational motion
 - c. the age is typical of spiral galaxies
 - d. all of these
10. Globular clusters
- a. have a lot of dust in them
 - b. contain a few hundred to a few thousand stars
 - c. contain mostly reddish stars
 - d. all of these

True or False

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

- _____ 11. The distant galaxies we can see are all spiral galaxies.
- _____ 12. Most of the galaxies we see from Earth are dwarf galaxies.
- _____ 13. Giant elliptical galaxies tend to have mostly younger blue stars.
- _____ 14. Every star that you can see in the night sky is in the Milky Way Galaxy.
- _____ 15. The Sombrero Galaxy got its name because it is a spiral galaxy with a large central bulge.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

16. The closest galaxy to Earth is the _____ Galaxy.
17. Why would two galaxies collide? _____
18. A system of two stars in a solar system is known as a(n) _____.
19. A(n) _____ is comprised of hundreds of thousands of stars that are held together by gravity.
20. Earth resides in the _____ Galaxy.
21. The Milky Way is a _____ type of galaxy.
22. A binary star is a _____ consisting of two stars orbiting around their common center of mass.
23. The feature containing the largest number of stars from a few million to a few billion is a(n) _____.

Short Answer

Answer each question in the space provided.

24. Open clusters tend to be younger than globular clusters. What evidence do astronomers have that points to the ages of these features?

25. Describe the Milky Way Galaxy and Earth's place in it.

Answer Key

1. d 2. c 3. a 4. a 5. a 6. a 7. d 8. b 9. b 10. c

11. false 12. false 13. false 14. true 15. true

16. Andromeda 17. gravity or gravitational attraction 18. binary star 19. star cluster 20. Milky Way Galaxy 21. spiral galaxy 22. star system 23. galaxy

24. Open clusters tend to be blue and have a lot of glowing dust and gas. This means that they are young since blue stars are relatively young and the dust and gas has not come together to form stars yet. Globular clusters have mostly red stars with little dust. Red stars are older and all of the dust and gas have already formed stars.

25. The Milky Way is a spiral galaxy of 100- to 400-billion stars with a central bulge, which might be shaped like a bar, that contains mostly older stars and globular clusters. The bulge is surrounded by a faint spherical halo that also contains old stars and globular clusters. At the center of the Galaxy is a supermassive black hole. Our solar system is a little more than halfway out one of the spiral arms of the Milky Way Galaxy and we orbit the center of the Galaxy. }

26.3 The Universe

Lesson Quiz

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. What did Edwin Hubble discover by observing absorption spectrum lines?
 - a. blueshift
 - b. redshift
 - c. yellowshift
 - d. greenshift
2. What explains the phenomenon that Hubble discovered?
 - a. the universe is becoming warmer
 - b. the universe is becoming cooler
 - c. the universe is collapsing
 - d. the universe is expanding
3. Scientists believe dark energy can explain what phenomenon?
 - a. the creation of the universe
 - b. the increasing rate of expansion of the universe
 - c. the collapse of the universe
 - d. the shape of the universe
4. Scientists believe what percent of the matter in the universe is dark matter?
 - a. 35%
 - b. 50%
 - c. 65%
 - d. 80%
5. The farther away a galaxy is
 - a. the faster it is moving away from us
 - b. the slower it is moving away from us
 - c. the faster it is coming toward us
 - d. the slower it is coming toward us
6. What does it mean if light is redshifted?
 - a. The object is moving away from the observer
 - b. The object is moving towards the observer
 - c. The object is slowing down
 - d. The object is moving perpendicular to the observer
7. The outside edges and interior of a galaxy rotate at the same speed. This is evidence for the existence of
 - a. dark matter

- b. dark energy
 - c. gravitational lensing
 - d. the Big Bang
8. What is the background temperature of the universe?
- a. 0K
 - b. 3K
 - c. 18K
 - d. 294K
9. The background radiation of the universe is
- a. absolute zero; all energy is tied up in stars
 - b. hot between galaxies and other features
 - c. left over from the Big Bang
 - d. none of these
10. Gravitational lensing indicates the existence of dark matter because
- a. light cannot escape the intense gravity of dark matter
 - b. only gravitational lensing can explain how dark matter can escape gravity
 - c. there is higher gravity than can be explained by the matter that is visible.
 - d. none of these
11. Dark matter is
- a. ordinary matter that does not emit radiation
 - b. unusual matter that may or may not have gravity
 - c. MACHOS and/or WIMPS
 - d. not well understood; at this time no one is certain
12. Scientists know the fate of the universe and it is
- a. it will expand forever
 - b. it will eventually start to collapse and do another Big Bang
 - c. it will expand to a point and then stay static
 - d. not well understood; at this time no one is certain

True or False

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

- _____ 13. Redshift is the shift of absorption bands toward the red end of the spectrum.
- _____ 14. Hubble's Law states, the farther away a galaxy is, the faster it is moving away from us.
- _____ 15. The percentage of the universe that is made of matter has decreased since the beginning.
- _____ 16. Cosmetology is study of the universe.
- _____ 17. The universe contains about a hundred million galaxies.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

18. _____ is a form of energy that has not yet been directly observed.
19. A few seconds after the universe began, the subatomic particles _____, _____ and _____- could form.
20. The _____ is everything.
21. When you look to the far edge of the universe, you are seeing _____.

22. Astronomers calculate the origin of the universe at around _____ years.
23. Light or sound is shifted as an object moves toward or away from an observer. This phenomenon is called _____ Effect.
24. As the universe _____ (contracts/stay the same size/expands) the galaxies within it _____- (contract/stay the same size/expand).
25. The gravitational pull from dark matter is called _____.

Short Answer

Answer each question in the space provided.

26. Describe the first few minutes after the Big Bang.

27. Describe two lines of evidence for the Big Bang origin of the universe.

Answer Key

1. b 2. d 3. b 4. d 5. a 6. a 7. a 8. b 9. c 10. c 11. d 12. d
13. true 14. true 15. true 16. false 17. false
18. dark energy 19. protons, neutrons, electrons 20. universe 21. back in time or from early in the universe 22. 13.7 billion 23. Doppler 24. expands; stay the same 25. gravitational lensing
26. The universe was extremely hot and dense. It began to expand and cool. In a few seconds, protons, neutrons and electrons could form and in a few minutes hydrogen came together. Energy could initiate nuclear fusion and hydrogen fused into helium. Neutral atoms came later. Matter was clumped across space but it eventually differentiated into stars, galaxies and other structure.
27. The red-shift of most objects means that they are moving apart. If they are now moving apart it is likely that they were once together. If all the matter and energy of the universe was together at a point, there must have been

a big bang to get them to move outward. The 3K background radiation is energy left over from that bang, just like there is warmth after you hit a rock with a hammer. }

26.4 Stars, Galaxies, and the Universe

Chapter Test

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Stars differ in all of the following ways except. . .
 - a. size
 - b. temperature
 - c. age
 - d. composition
2. A main sequence star is powered by
 - a. nuclear fission reactions
 - b. the fusing of helium into the heavier elements
 - c. the fusing of hydrogen into helium
 - d. none of these
3. The coolest stars are _____; the hottest stars are _____.
 - a. yellow; orange
 - b. blue; orange
 - c. yellow; yellow
 - d. red; blue
4. Our star, the Sun, will likely end its life as a
 - a. red giant
 - b. black hole
 - c. white dwarf
 - d. supernova
5. A star forms from
 - a. a nebula; gravity causes material to collapse until fusion begins
 - b. particles or rock and metal that smash together to form a body that begins nuclear fusion
 - c. a supernova explosion that releases material into space
 - d. none of these
6. Evidence for the Big Bang includes
 - a. the background radiation in the universe of 0K
 - b. blueshift, indicating that the universe is expanding
 - c. ancient matter that appears in stardust
 - d. none of these
7. Galaxies are
 - a. made of billions to trillions of stars

- b. stationary in space
 - c. elliptical, spiral or irregular
 - d. none of these
8. What did the Andromeda Nebula turn out to be?
- a. a galaxy
 - b. a gas cloud where stars are created
 - c. the farthest galaxy that astronomers can see
 - d. none of these
9. The farther away a galaxy, the faster it is moving away from us is called. . .
- a. Hubble's Law
 - b. the law of reverse gravitation
 - c. the Big Bang Theory
 - d. the Doppler Effect
10. By analyzing the spectrum of light from distant galaxies, astronomers learned that they are
- a. made of different materials
 - b. moving away from us
 - c. hotter the farther out they are
 - d. none of these

True or False

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

- _____ 11. A star's color is determined by the temperature at its core.
- _____ 12. Stars have a life cycle.
- _____ 13. The element helium was first discovered in the spectrum of the Sun.
- _____ 14. A neutron star is made almost entirely of neutrons.
- _____ 15. Black holes are so dense that not even light can escape their gravity.
- _____ 16. Galaxies are divided into three types according to their shape.
- _____ 17. The study of the universe is called astrology.
- _____ 18. The Big Bang Theory is the most widely accepted cosmological explanation on how the universe formed.
- _____ 19. Dark matter can be observed even though it emits no electromagnetic radiation.
- _____ 20. Scientists think dark energy makes up 71% of the total energy in the universe.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

21. A _____ is a giant ball of glowing gas at a very, very high temperature.
22. A _____ explosion contains so much energy that atoms can fuse together to produce gold, silver, and uranium.
23. _____ is the apparent shift in position that takes place when the position of the observer changes.
24. The _____ contains all the star systems, galaxies, gas and dust, plus all the matter and energy in existence.
25. By analyzing the spectrum lines of a star, astronomers can learn its _____.
26. The _____ of the galaxies means that the universe is expanding.

27. A pattern of stars in the sky is a(n) _____.
28. _____ are groups of young stars held together by gravity.
29. _____ are collections of millions to many billions of stars.
30. _____ are spherical groups of old stars held together by gravity.

Short Answer

Answer each question in the space provided.

31. How does a supernova form and what would the universe be like if there weren't any?

32. What evidence do astronomers have for the existence of dark matter and dark energy?

33. Describe the location of planet Earth as accurately as you can.

Answer Key

1. d 2. c 3. d 4. c 5. a 6. d 7. c 8. a 9. a 10. b

11. false 12. true 13. true 14. true 15. true 16. true 17. false 18. true 19. false 20. false

21. star 22. supernova 23. parallax 24. universe 25. composition 26. redshift 27. constellation 28. open clusters 29. galaxies 30. globular clusters

31. A massive star that leaves the main sequence becomes a red supergiant. When all the helium is gone, lighter atoms fuse into the heavier atoms up to iron. When there are no more elements to fuse, the core collapses and creates a violent supernova explosion. There is so much energy in a supernova that the atoms fuse to produce the heavier elements. They all fly out into space and are available to make planets and lifeforms. Without supernovas, everything would just be made of elements up to iron, although even these materials wouldn't be spread around.

32. Dark matter doesn't emit light but it does have gravity so it affects the objects around it. For example, the outside edges of a galaxy rotate at the same speed as material near the center, which can only be explained with dark matter. Light is also bent around some objects that do not have enough mass visible so there must be dark matter. Dark energy must exist because the rate of expansion of the universe accelerating, which requires dark energy.

33. Earth is the third planet out in a solar system with an ordinary star at its center. The solar system is a little more than halfway out one of the spiral arms of the Milky Way Galaxy, about 26,000 light years from its center. The galaxy is a spiral galaxy that is part of the universe, which has billions of galaxies. We are not at the edge of the known universe.}

CHAPTER

27**HS Earth Science Unit
Assessment****Chapter Outline**

- 27.1 UNIT 1: INTRODUCTION TO THE STUDY OF EARTH TEST**
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27.1 Unit 1: Introduction to the Study of Earth Test

Unit 1 chapters: *What is Earth Science?* and *Studying Earth's Surface*

- The answer keys can be found in the Resource tab above the Table of Contents.

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which of the following is the longest mountain range on Earth?
 - a. mid-ocean ridge
 - b. Andes
 - c. Great Dividing Range
 - d. Himalayas
2. Which imaginary line circles Earth below the equator (Southern Hemisphere)?
 - a. Tropic of Cancer
 - b. Tropic of Capricorn
 - c. Equator
 - d. Prime Meridian
3. Which of the following is not created by constructive forces?
 - a. Mt. Fuji
 - b. Mt. Everest
 - c. Barringer (aka Meteorite) Crater in Arizona
 - d. East African Rift
4. What is the main disadvantage of a Mercator projection?
 - a. distortion near the equator
 - b. distortion of landmasses
 - c. distortion near the poles
 - d. true direction is not shown
5. How many satellites are needed to determine the longitude and latitude of an object by GPS?
 - a. 3
 - b. 4
 - c. 24
 - d. 12
6. Which of these coordinates is not valid?
 - a. $41^{\circ}52'55''\text{N } 87^{\circ}37'40''\text{W}$
 - b. $\text{S } 22.90^{\circ}, \text{W } 43.20^{\circ}$
 - c. $\text{N } 98.33^{\circ}, \text{W } 76.15^{\circ}$
 - d. $0^{\circ}0'00''\text{N } 0^{\circ}0'00''\text{W}$
7. Which of the following scientists would most likely study hurricanes?
 - a. hydrologist
 - b. meteorologist

- c. geochemistry
 - d. paleontology
8. Which of the following should not be done in the laboratory?
- a. wearing goggles
 - b. tying long hair back
 - c. keeping your area clean
 - d. eating and drinking
9. What is the procedure used by scientists to do their work?
- a. assumptions
 - b. scientific method
 - c. deductive reasoning
 - d. inductive reasoning
10. What is the goal of science?
- a. Answer all questions.
 - b. Explain how things work.
 - c. Understand the natural world.
 - d. Find a cure for cancer.
11. What is the term for a plausible explanation to a scientific question?
- a. hypothesis
 - b. theory
 - c. law
 - d. none of the above
12. What process is used to collect data when it is not possible for practical or ethical reasons to perform experiments?
- a. inductive reasoning
 - b. research
 - c. observation
 - d. all of these

True or False

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

- _____ 13. Constructive forces cause landforms to grow
- _____ 14. Hydrology includes Oceanography
- _____ 15. A scientific question must be testable.
- _____ 16. Research is not essential to the scientific process.
- _____ 17. Testable questions are needed for scientists to understand the natural world.
- _____ 18. A map is not a good example of a physical model.
- _____ 19. A conceptual model ties together many ideas in an attempt to explain a phenomenon.
- _____ 20. The idea that moon formed when a Mars-sized planet hit the Earth is a good example of a conceptual model.
- _____ 21. In the science lab, it is important to follow directions at all times.
- _____ 22. In the field, it is not necessary to have a first aid kit.
- _____ 23. The ocean basins are all younger than 180 million years.

_____ 24. Volcanic eruptions are an example of a destructive force.

_____ 25. Direction is not important for the study of earth science.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

26. The Marianas Trench is the deepest _____ in the world.

27. The first map projection was developed by Gerardus _____ in 1569.

28. On a globe, the shortest distance between two points is a(n) _____.

29. A chart used to locate an underwater shipwreck is a(n) _____.

30. A weather satellite travels around Earth in a _____ orbit.

31. _____ is the midpoint between high and low tide.

32. Triangulation is one way of determine the _____ of an object.

33. The branch of Earth science that interests me most is _____.

34. _____ maps show elevations using contour lines to reveal landforms.

35. Why are there more earthquakes in India than in South Africa? is a(n) _____.

Short Answer

Answer each question in the space provided.

36. Why are four satellites required by the GPS system to determine your location?

37. What does a geologist study?

38. What is peer review? Why is it important to the scientific community?
39. List 4 major branches of Earth Science and explain how they relate to the Earth.
40. What is GIS and why is it useful?

Answer Key

1. a 2. b 3. d 4. c 5. b 6. c 7. b 8. d 9. b 10. c 11. a 12. c
13. true 14. true 15. true 16. false 17. true 18. false 19. true 20. true 21. true 22. false 23. true 24. true 25. false
26. ocean trench 27. Mercator 28. arc (curved line) 29. bathymetric map 30. polar orbit 31. Sea level 32. location
33. Any branch should be acceptable. 34. Topographic 35. scientific question
36. Four satellites are needed because each will calculate a distance from itself, but that is just a circle. At least three circles (that is, three distances from three receivers) are needed to know an exact location. The fourth makes the calculation more certain.
37. A geologist studies Earth's solid material and structures and the processes that create them.
38. When a scientist submits a professional paper for publication, that paper is sent out to other scientists for peer review. The reviewers make sure that the scientist followed good scientific method and made logical inferences from the data. Peer review helps the scientific community to maintain high standards and to be sure that science is different from other ways of thinking.

39. Geology - study of the land. Oceanography -the study of the oceans. Meteorology - the atmosphere. Climatology - the climate and Earth systems. Astronomy - Earth's place in the universe. Environmental science - how people interact with the Earth.

40. Geographic information systems - use exact geographic locations from GPS along with any type of spatial information to create maps and images. GIS can be used to make maps of population density, natural resource distribution, flood damage, and much more. }

27.2 Unit 2: Earth's Mineral and Energy Resources Test

Unit 2 chapters: *Earth's Minerals, Rocks, and Earth's Energy*

- The answer keys can be found in the Resource tab above the Table of Contents.

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which of these makes up an atomic mass number?
 - a. the number of protons
 - b. the number of neutrons
 - c. the number of protons, neutrons and electrons
 - d. the number of neutrons and protons
2. Which is rarely very useful for mineral identification?
 - a. cleavage
 - b. luster
 - c. color
 - d. hardness
3. Which of the following is not a mineral?
 - a. coal
 - b. diamond
 - c. table salt
 - d. quartz
4. What igneous rock has no visible crystals as a result of rapid cooling?
 - a. breccia
 - b. obsidian
 - c. andesite
 - d. pegmatite
5. An ore deposit
 - a. contains many valuable minerals.
 - b. is profitable to mine.
 - c. is a mineral deposit in which the price is rising.
 - d. is made of different metals.
6. Which of the following does not affect the formation of magma?
 - a. temperature
 - b. pressure
 - c. volume
 - d. mineral composition
7. Which of the following is sometimes used as building material?
 - a. talc
 - b. slate

- c. limestone
 - d. diamond
8. During metamorphism, extreme pressure often leads to
- a. foliation
 - b. the creation of magma
 - c. extremely high temperatures
 - d. crystallization
9. During lithification, sediments undergo
- a. cementation
 - b. compaction
 - c. compaction and/or cementation
 - d. crystallization
10. In the rock cycle
- a. an igneous rock or a metamorphic rock can become a sedimentary rock.
 - b. a sedimentary rock can become an igneous or a metamorphic rock.
 - c. a sedimentary rock can become a different sedimentary rock.
 - d. any rock can become any other type of rock.
11. The accident at the Fukushima Daiichi Nuclear Power Plant in Japan was due to
- a. operator error.
 - b. a large earthquake.
 - c. the nuclear reaction proceeding too rapidly.
 - d. a political upheaval.
12. What type of energy is derived from heated groundwater?
- a. solar energy
 - b. geothermal energy
 - c. hydroelectric energy
 - d. nuclear energy
13. Renewable energy sources typically are
- a. cleaner than non-renewable energy sources.
 - b. cheaper than non-renewable energy sources.
 - c. better developed than non-renewable energy sources.
 - d. more transportable than non-renewable energy sources.
14. Useful solar power comes from
- a. panels on a building's roof.
 - b. plants with large numbers of mirrors and a receiver.
 - c. metal boxes that can be used as ovens.
 - d. all of these.
15. Biomass energy will likely
- a. rely mostly in crop plants like corn.
 - b. rely more heavily on algae and other non-food crops.
 - c. rely increasingly on trees and other non-farmed plants.
 - d. not play a major role in our energy future.

True or False

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

- _____ 16. Water can only hold a certain amount of dissolved minerals.
- _____ 17. An atom's nucleus has a positive electrical charge.
- _____ 18. A mineral is a naturally-occurring, inorganic substance, that has a specific chemical composition, and a crystalline structure.
- _____ 19. The United States produces as much energy as it consumes.
- _____ 20. The more a metamorphic rock resembles its parent rock, the more metamorphism it has likely undergone.
- _____ 21. The joining of isotopes to make molecules is chemical bonding.
- _____ 22. Hydrogen bonds are weak bonds between polar molecules.
- _____ 23. Metamorphism occurs because of crystallization and pressure.
- _____ 24. Silicate minerals form in different shapes due to the different ways the silica tetrahedra come together.
- _____ 25. Different types of minerals crystallize from magma at different temperatures.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

26. _____ are valuable minerals found in stream gravels.
27. Halide minerals are _____ that form when water evaporates.
28. A _____ sedimentary rock can contain sediments, organic materials and chemical precipitates.
29. Living creatures can make rocks that are called _____ sedimentary rocks.
30. Energy moves from high temperatures to lower temperatures in adjacent materials through _____.
31. Water is a _____ because it has an uneven electrical charge.
32. The largest mineral group is the _____.
33. Mohs scale ranks the _____ of 10 minerals.
34. Multiple elements are bonded together in a(n) _____.
35. _____ metamorphism takes place in rock that is exposed to the heat of a nearby magma.

Short Answer

Answer each question in the space provided.

36. How would you test the hardness of an unknown mineral? Why would you do this?

37. Explain the difference between surface and underground mining. How might mining damage the environment?

38. Describe the two different ways that igneous rocks form. What characteristics will you see in the rocks that form in each way?

39. Explain the problems with non-renewable energy sources.

40. Choose one renewable energy source and explain why it would be your preferred energy source.

Answer Key

1. d 2. c 3. a 4. b 5. b 6. c 7. c 8. a 9. c 10. d 11. b 12. b 13. a 14. d 15. b

16. true 17. true 18. true 19. false 20. false 21. false 22. true 23. false 24. true 25. true

26. placers 27. salts 28. clastic 29. biochemical 30. conduction 31. polar molecule 32. silicates 33. hardness 34. chemical compound 35. contact

36. To test the hardness of an unknown mineral, find the minerals on the Moh's hardness scale. See which minerals the unknown can scratch and which can scratch it. From this you should be able to determine the hardness of the mineral. That is one bit of evidence for figuring out what the mineral is.

37. Surface mining strips the upper surface of the Earth to get to the minerals. Underground mining clears the land of trees and soil – nearby streams could be inundated with sediment. Pollutants are also an issue with mines. Acids contaminate some areas when mining heavy metals. Pits must be refilled or reshaped. Surface mining involves digging shafts and corridors underground to get to the minerals. Underground mining is more expensive and dangerous than surface mining.

38. All igneous rocks form from magma. When magma cools beneath the surface, it cools slowly. In these intrusive igneous rocks the minerals that are larger and better formed. When magma cools at the surface, it cools rapidly. In these extrusive igneous rocks the minerals are smaller or they may even not form and just create a glass.

39. Non-renewable resources are not being replaced by natural processes. When they are gone, they are just gone. Eventually we will need to replace them. Mining or drilling for these materials is often destructive to the environment. Burning them produces pollutants and greenhouse gases. Nuclear energy, which is clean burning, has rare but serious accidents.

40. Answers will vary. Students can choose wind, hydroelectric, solar, geothermal, or biomass. They will need to explain the benefits of their choice. }

27.3 Unit 3: Processes Inside Earth Test

Unit 3 chapters: *Plate Tectonics*, *Earthquakes*, and *Volcanoes*

- The answer keys can be found in the Resource tab above the Table of Contents.

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Compared with continental lithosphere, oceanic lithosphere is
 - a. thinner, less dense, and more likely to subduct
 - b. thicker, more buoyant and less likely to subduct
 - c. thinner, denser, and more likely to subduct
 - d. thicker, denser, and less likely to subduct
2. At a divergent plate boundary,
 - a. sediments are extremely thick
 - b. new seafloor is created
 - c. old seafloor is destroyed
 - d. crust is neither created nor destroyed
3. Which is not true of Earth's lithosphere?
 - a. it is brittle
 - b. it is broken into plates
 - c. it is made of the crust and the mantle
 - d. it can have both oceanic and continental crust
4. When an oceanic plate converges with a continental plate
 - a. the less dense oceanic plate slides under the denser continental plate.
 - b. the denser oceanic plate slides under the less dense continental plate.
 - c. the less dense oceanic plate slides past the denser continental plate.
 - d. the denser oceanic plate slides on top of the less dense continental plate.
5. The theory of plate tectonics is
 - a. the idea that plates of lithosphere move around Earth's surface due to convection in the core.
 - b. the theory that continents move around on Earth's surface, although no one is quite sure how that happens.
 - c. the idea that new seafloor is created and old seafloor is destroyed
 - d. a combination of the observations that the continents were joined and moved apart with the mechanism of seafloor spreading.
6. With increasing distance from the epicenter, the difference in P and the S wave arrival times _____.
 - a. increases
 - b. decreases
 - c. stays constant
 - d. none of the above
7. Which of the following observations may indicate a forthcoming destructive earthquake?

- a. an increase in the frequency of smaller earthquakes
 - b. rapid tilting of the ground
 - c. rapid changes in water levels in wells
 - d. all of these
8. When stresses build up in a rock, the rock will
- a. break
 - b. fold
 - c. remain unchanged
 - d. any or all of these
9. The Richter magnitude scale measures
- a. the total energy released by an earthquake
 - b. the energy released by the largest jolt in an earthquake
 - c. the intensity of what residents felt and the damage the quake did
 - d. all of these
10. Deadly ocean waves that come from an earthquake are called
- a. tidal waves
 - b. sea waves
 - c. tsunami
 - d. rogue waves
11. Subduction results in volcanoes because
- a. the hot plate heats the mantle so it melts.
 - b. sediments contain water, which lowers the melting point of the mantle above the plate.
 - c. the subduction plate releases pressure on the region so the mantle melts.
 - d. none of these.
12. Magma with high silica will probably cause
- a. an effusive eruption, such as a lava plateau
 - b. an explosive eruption or an igneous intrusion
 - c. pillow basalts
 - d. a chain of hotspot volcanoes
13. A volcano made from lots of fluid flows of mafic lava is a(n)
- a. shield volcano
 - b. supervolcano
 - c. composite volcano
 - d. cinder cone
14. A volcano's slope may change shape before an eruption because
- a. gases and magma move up into a magma chamber
 - b. earthquakes move ground around
 - c. gases expand as they change in composition
 - d. none of these
15. Above a hotspot, you may find
- a. chains of shield volcanoes increasing in age with distance.
 - b. a giant caldera and evidence of catastrophic eruptions.
 - c. nothing but normal continental crust.
 - d. any or all of these.

True or False

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

- _____ 16. Continental crust is made almost entirely of felsic rock.
- _____ 17. Sediment is thickest near the shore where it comes off the continents in rivers and on wind currents.
- _____ 18. The mantle is solid, ultramafic rock that can flow.
- _____ 19. Heat flow by the rapid collisions of atoms from a warmer to a cooler place is called convection.
- _____ 20. Alfred Wegener proposed that the continents were once united into a single supercontinent called Pangaea.
- _____ 21. A reverse fault in which the fault plane angle is nearly horizontal is a strike-slip fault.
- _____ 22. An anticline forms by folding of rock layers caused by compressive forces.
- _____ 23. All major earthquakes occur at plate boundaries.
- _____ 24. The ground type over where an earthquake occurs is a major factor in determining how much damage will be caused.
- _____ 25. Pangaea was Earth's first supercontinent.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

26. When the magnetic polarity reverses, the _____ becomes the _____ and the _____ becomes the _____.
27. _____ in the mantle drive plate movements.
28. Oceanic crust is created at features in the oceans called _____.
29. Tectonic plates slide past each other at a(n) _____ plate boundary.
30. Plumes of magma rise to the surface and create volcanoes at _____.
31. There have been only five earthquakes in human history with the highest magnitude, above a _____.
32. Most volcanoes are found around the Pacific Ocean basin because there are so many _____.
33. A bend that causes rocks to be inclined relative to the horizon is a(n) _____.
34. A mountain composed of layers of lava and ash is a _____.
35. The lithospheric plates can be identified by mapping _____.

Short Answer

Answer each question in the space provided.

36. List the evidence for continental drift, both Wegener's evidence and the evidence that came afterwards.

37. Describe the three types of plate boundaries. What types of volcanoes and earthquakes are found at each?

38. What determines how deadly an earthquake is?

39. Why are no rocks in the oceans older than 180 million years? Why was this discovery so important?

40. Describe the three types of volcanoes (not supervolcanoes) for their size, lava composition and style of eruption.

Answer Key

1. c 2. b 3. c 4. b 5. d 6. a 7. d 8. d 9. b 10. c 11. b 12. b 13. a 14. a 15. d

16. false 17. true 18. true 19. false 20. true 21. false 22. true 23. false 24. true 25. false

26. magnetic north pole, magnetic south pole; magnetic south pole, magnetic north pole 27. convection 28. mid-ocean ridge 29. transform fault 30. hotspots 31. 9 32. convergent plate boundary 33. monocline 34. composite 35. earthquake epicenters

36. Identical rocks on both sides of the Atlantic Ocean. Mountain ranges with the same rock types and structures on opposite sides of the Atlantic Ocean. Ancient fossils of the same species of extinct plants and animals are found in rocks of the same age but are on continents that are now widely separated. Grooves and rock deposits left by ancient glaciers are found on different continents. Ancient coral reefs and coal seams are found in locations where it is much too cold for them to develop today. Apparent polar wander in which magnetic poles appear to have drifted and there appear to have been more than one north magnetic pole.

37. Divergent: Plates move apart. In the oceans, new seafloor is created. This occurs at mid-ocean ridges, which are long chains of volcanoes. There are shallow earthquakes. Within a continent, the continent breaks apart.

Convergent: Plates move together. If one is an oceanic plate, the denser plate will subduct. This leads to shallow-intermediate-and deep earthquakes as the plate plows through the mantle. A volcanic arc forms above the subducted plate on land if the upper plate is a continental plate (continental arc) or in the ocean if it is an oceanic plate (island arc). If both plates are continents, a large mountain range will be created. Lots of earthquakes, but the crust is too thick for magma to penetrate and create volcanoes.

Transform: Plates slide past each other. In most locations, the crust is too thick for magma to penetrate and create volcanoes, but there are enormous earthquakes.

38. Population density: the more people, the more can die. Not size: A large earthquake will kill more people than a small one all other things being equal, but lots of times other factors come into play. Ground type: solid rock vibrates less and so is safer, sediments can undergo liquefaction and become like quicksand

39. New oceanic crust is constantly being created at mid-ocean ridges and being destroyed at trenches. So the oldest oceanic crust is much younger than the oldest continental crust. The movement of the crust is like a conveyor belt that carries the continents along. This was one of the factors that allowed scientists to recognize seafloor spreading which was essential as the mechanism for explaining how continents could drift and providing a mechanism for plate tectonics.

40. Shield volcanoes are massive and spread out. They may not be high. Since they are made of fluid, mafic lavas, the lavas spread out and do not form a big volcanic peak. They tend to have effusive eruptions. Composite volcanoes are tall and peaky. They are made of intermediate to felsic lavas and have more explosive eruptions. Cinder cones can be any composition. They tend to be small and are often the result of just one eruption. }

27.4 Unit 4: Processes on Earth's Surface Test

Unit 4 chapters: *Weathering and Formation of Soil* and *Erosion and Deposition*

- The answer keys can be found in the Resource tab above the Table of Contents.

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which is not a type of mass movement?
 - a. creep
 - b. avalanche
 - c. beach deposits
 - d. landslide
2. Soil that was moved by erosion is a
 - a. residual soil
 - b. tropical soil
 - c. mass wasting soil
 - d. transported soil
3. As sediments exit a steep canyon onto open land, they form a(n) _____.
 - a. alluvial fan
 - b. fluvial fan
 - c. sediment fan
 - d. fan
4. Gases such as carbon dioxide, sulfur dioxide and nitrogen oxides mix with water in the atmosphere to create
 - a. calcium carbonate
 - b. acids
 - c. greenhouse gases
 - d. ozone
5. Soil is
 - a. easily eroded.
 - b. essential for modern society.
 - c. a renewable resource if carefully managed.
 - d. all of these.
6. Wind erosion is strongest in which type of region?
 - a. arid
 - b. humid
 - c. ocean
 - d. tropical
7. Farms on hillsides may have soil plowed in curved bands because it
 - a. prevents fires from spreading if one starts.
 - b. exposes more topsoil.

- c. exposes more bedrock to reduce landslides.
 - d. reduces erosion.
8. The characteristics of soil found in the arid western U.S. include
- a. heavy chemical weathering
 - b. high organic material
 - c. a concentration of calcium carbonate
 - d. heavy leaching
9. What weathering chemicals are made by decaying plants?
- a. alkalis
 - b. acids
 - c. salts
 - d. bases
10. A small lake on flat land in limestone rock is probably a(n)
- a. tarn
 - b. kettle
 - c. cirque
 - d. sinkhole
11. The long- term temperature and precipitation in a region determines its
- a. weather
 - b. climate
 - c. soil type
 - d. vegetation
12. Since streams erode the outer bend and deposit along the inside curve,
- a. meanders migrate laterally over time.
 - b. meanders straighten out over time.
 - c. they become incised meanders.
 - d. they overflow onto the floodplain.
13. A column forms when
- a. a stalactite from the ceiling and a stalagmite from the floor join.
 - b. a stalagmite from the ceiling and a stalactite from the floor join.
 - c. travertine flows downhill in a column-like structure.
 - d. calcite flows downhill in a column-like structure.
14. Creep is
- a. the transport of sediment grains pushed along the surface by wind.
 - b. the sliding of soil slowly down a hillside.
 - c. both of these.
 - d. neither of these.
15. Which of the following is not the result of cirques?
- a. two on the sides of a ridge form an arête
 - b. three near the top of a mountain form a horn
 - c. one in glacial till form a sinkhole
 - d. one filled with water is a tarn

True or False

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

- _____ 16. Mechanical weathering may increase the rate of chemical weathering, but not the reverse.
- _____ 17. Flowing water does the work of erosion, but not deposition.
- _____ 18. If you stop water from rising into one area - e.g. with a levee or breakwater - the water will probably flood a nearby location.
- _____ 19. Wind and streams both cause abrasion.
- _____ 20. Rust is a form of oxidation.
- _____ 21. The layer of soil containing the most organic material is the C horizon.
- _____ 22. Stalactites are formed by calcium sulfate.
- _____ 23. A natural levee does not protect nearby lands from flooding.
- _____ 24. Plate tectonics processes build up landforms, erosional processes destroy landforms.
- _____ 25. Loess is windblown silt and clay deposited layer on layer over a large area.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

26. A(n) _____ is a slip of a single mass of soil or rock.
27. A(n) _____ is a mixture of light-colored, coarse sediments layered with darker, fine sediments deposited in a glacial lake.
28. A river starts at its _____ and ends at its mouth.
29. A(n) _____ is formed as waves erode undercut cliffs.
30. _____ are faceted stones formed by abrasion from sand particles.
31. _____ carries dissolved minerals to lower layers in the soil.
32. A tropical soil in which intense chemical weathering has left behind the least soluble minerals is a(n) _____ - _____
33. Small bits of minerals, rocks, shells and coral make up _____
34. A _____ is a curve in a stream channel.
35. _____ water does the work of both erosion and deposition.

Short Answer

Answer each question in the space provided.

36. Explain how mechanical weathering differs from chemical weathering.

37. Draw and describe a soil profile.

38. How do streams deposit natural levees and why are they important?

39. As glaciers melt back, what depositional features do you expect to see?

40. List and define each of the human-made structures that protect shorelines.

Answer Key

1. c 2. d 3. a 4. b 5. d 6. a 7. d 8. c 9. b 10. d 11. b 12. a 13. a 14. c 15. c

16. true 17. false 18. true 19. true 20. true 21. false 22. false 23. false 24. true 25. true

26. slump 27. varve 28. headwaters 29. wave-cut platform 30. ventifacts 31. leaching 32. laterite 33. sand 34. meander 35. flowing or running

36. Mechanical weathering breaks down rocks into smaller pieces but the composition of the rock is the same. Chemical weathering changes the chemical composition of the minerals into different minerals, ones that are more stable at the conditions found at the surface.

37. Students should draw a profile with the following layers:

A Horizon - topsoil – darkest layer – contains the most organic material and biological activity.

B Horizon – subsoil – where soluble minerals and clays accumulate. It is lighter brown and holds more water.

C Horizon – partially altered bedrock - rocks can be identified even though they have been weathered.

38. A flooding stream overflows its banks and broadens its channel. The stream deposits its sediments, the largest first, at the channel lip. This creates a natural levee. After many floods the levees build up high enough that they protect the floodplain from all but the highest floods.

39. A melting glacier will dump its sediments, creating moraines. There will be a moraine at the farthest point the glacier advanced to, called a terminal moraine; at various points that the glacier stopped for a while, called end moraines; along the sides of the glacier, called lateral moraines; along the center where two tributary glaciers join, called medial moraines; and spread around beneath where the glacier was, called ground moraines.

40. Groin – long narrow pile of rocks built perpendicular to the shoreline

Breakwater – structure built in the water parallel to shore

Seawall – parallel to the shore but it is built onshore. }

27.5 Unit 5: Earth's Past Test

Unit 5 chapters: *Evidence About Earth's Past* and *Earth's History*

- The answer keys can be found in the Resource tab above the Table of Contents.

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

- Ice cores contain information about
 - the age of the ice going back millions of years.
 - how the atmosphere has changed.
 - how glaciers have advanced and receded over time.
 - all of these.
- Which of the following spans of time is the longest?
 - Phanerozoic
 - Paleozoic
 - Cambrian
 - Precambrian
- Fossils are
 - the remains of ancient life.
 - the evidence of the activities of ancient life.
 - formed by permineralization, replacement, and compression, among others.
 - all of these.
- Using the law of lateral continuity, geologists can
 - link together the geologic history of a region.
 - determine the relative ages of rock strata.
 - determine the absolute ages of rock strata.
 - all of these.
- The guiding principle for understanding Earth history is
 - the present is the key to the past
 - the more things change the more they stay the same
 - nothing ever changes
 - we can't know about the past because natural laws change
- During the _____ (which makes up almost 90% of Earth's history) simple anaerobic forms of life appeared and were followed by photosynthetic forms, which added oxygen to the atmosphere.
 - Paleozoic
 - Precambrian
 - Mesozoic
 - Devonian
- Carbon 14 has a half life of 5,730 years. In 11,460 years the ratio of parent to daughter isotope will be
 - 75:25

- b. 50:50
 - c. 25:75
 - d. 12.5:87.5
8. Gases in the early atmosphere came from
- a. comets, volcanism and photosynthesis.
 - b. comets and volcanism.
 - c. volcanism, photosynthesis and cellular respiration.
 - d. photosynthesis and cellular respiration.
9. Which of the following statements is true about fossilization?
- a. It is a common occurrence.
 - b. It is more common for animals from mountains and forests than for those from deserts and oceans.
 - c. Small animals with light weight, thin bones are more likely to become fossils than are large animals with heavy, dense bones.
 - d. none of the above
10. Earth's second atmosphere was
- a. composed mostly of hydrogen and helium
 - b. very similar to the atmosphere we have now
 - c. lacking in oxygen
 - d. very rich in ozone and carbon dioxide
11. Scientists think the mass extinction that occurred 66 million years ago was the result of
- a. massive volcanic eruptions
 - b. the impact of a Mars-sized planet
 - c. an asteroid impact
 - d. climate change
12. The oldest felsic continental crust, when found at the surface is a(n)
- a. platform
 - b. craton
 - c. microcontinent
 - d. shield
13. A cell needs
- a. a way to replicate itself
 - b. a metabolism
 - c. a way to separate itself from its environment
 - d. all of these.
14. The fossil record shows that
- a. present day life forms evolved from earlier life forms.
 - b. life evolves from simple to complex in a straight line.
 - c. animals evolved from plants, which evolved from bacteria.
 - d. life does not change over time, but life forms stay the same until they go extinct.
15. Biological evolution is
- a. the idea that humans evolved from chimps.
 - b. the changes in a population that accumulate over time.
 - c. the idea that all life was created by a supreme being over a very brief period of time.
 - d. the idea that the changes in life forms over time have led to the pinnacle - humans.

True or False

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

- _____ 16. Land organisms can be buried by mudslides, volcanic ash, or sand to eventually become fossilized.
- _____ 17. Cross-cutting relationships helps geologists to determine the older and younger of two rock units.
- _____ 18. During the Paleozoic, there were six marine transgressions.
- _____ 19. The largest mass extinction occurred at the end of the Cenozoic, when the dinosaurs died out.
- _____ 20. Different isotope pairs are used to date materials of different ages.
- _____ 21. About fifty percent of all living organisms become fossils.
- _____ 22. The layers of sediment created in lakes are called varves.
- _____ 23. Multicellular organisms evolved from early eukaryotes.
- _____ 24. The mechanism for change in a population of organisms is natural selection.
- _____ 25. Pangaea was created when Laurentia and Gondwana collided.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

- 26. Continents sometimes collide and form a(n) _____, like Rodinia.
- 27. Absolute dating of substances can be determined using _____.
- 28. Swamps during the _____ Period became the coal and petroleum that we use today.
- 29. The principle of _____ states that we can understand what happened in the past because the processes are the same as what happens today.
- 30. A mountain building event that takes place when a continent runs into another landmass is a(n) _____.
- 31. The Phanerozoic began _____ years ago and ended _____ years ago.
- 32. The Earth is approximately _____ years old.
- 33. The _____ era was the age of the dinosaurs.
- 34. Ancient _____ indicates the presence of an ancient subduction zone.
- 35. _____ were essential for the origin of life because they link together to form proteins.

Short Answer

Answer each question in the space provided.

- 36. Why was oxygen needed in the atmosphere before complex life could evolve?

- 37. What is the current hypothesis for how eukaryotes evolved from prokaryotes?

38. Explain the difference between absolute age and relative age.

39. Briefly describe two lines of evidence that Earth is 4.6 billion years old.

40. What are adaptations? How do adaptations develop?

Answer Key

1. b 2. d 3. d 4. a 5. a 6. b 7. c 8. a 9. d 10. c 11. c 12. b 13. d 14. a 15. b

16. true 17. true 18. false 19. false 20. true 21. false 22. true 23. false 24. true 25. true
26. supercontinent 27. radiometric dating 28. Carboniferous 29. uniformitarianism 30. orogeny 31. 570 million; 0! We are still in the Phanerozoic. 32. 4.6 billion 33. Mesozoic 34. greenstones 35. amino acids
36. Oxygen is essential for life on Earth for two reasons: (1) three oxygen ions come together to make ozone, which protects the surface from harmful ultraviolet radiation, and (2) animals need oxygen to breathe.
37. Prokaryotes began to live together in symbiotic relationships. The symbiotic relationship created a beneficial relationship where the cells did not harm each other. The small cells took on a specialized function and became organelles within a larger cell. This led to the first eukaryotic cell.
38. Absolute age is the exact age of rocks and is determined using radiometric dating or another technique in which an exact age can be determined. Relative age is the dating of objects based upon their relationship to each other. So one object is older than another but we can't determine how old either object is exactly.
39. Zircon crystals in sedimentary rocks have been dated at 4.4 billion years. Meteorites that have come in from elsewhere in the solar system are around 4.5 billion years. Moon rocks are also dated to around that time.
40. Adaptations are favorable traits that organisms inherit. Adaptations develop when variations in a species help them survive better than others. Often adaptations come from mutations. }

27.6 Unit 6: Earth's Water Test

Unit 6 chapters: *Earth's Fresh Water* and *Earth's Oceans*

- The answer keys can be found in the Resource tab above the Table of Contents.

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. The difference between a pond and a lake is
 - a. just size; ponds are smaller.
 - b. ponds form from ice age glacial activity; lakes from volcanic eruptions and faulting.
 - c. lakes form from ice age glacial activity; ponds from volcanic eruptions and faulting.
 - d. ponds are smaller and they usually have no outlet.
2. What type of rock layer can water not penetrate?
 - a. impermeable
 - b. permeable
 - c. porous
 - d. sandstone
3. Water basins are separated by a
 - a. separation
 - b. divide
 - c. barrier
 - d. levee
4. Salt water from the sea mixes with fresh water from a river in a(n)
 - a. marsh
 - b. estuary
 - c. swamp
 - d. wetland
5. The deepest trench in the ocean is Marianas Trench, how deep is it?
 - a. 3,814 ft
 - b. 53,418 ft
 - c. 35,814 ft
 - d. 135,481 ft
6. If ocean water freezes near the poles, the remaining water will probably
 - a. sink because it is more saline.
 - b. sink because it is warmer than the ice.
 - c. float because it is warmer than the ice.
 - d. float because it is more dense.
7. Which best describes the water movements caused by the Coriolis effect?
 - a. clockwise in the southern hemisphere and counterclockwise in the northern hemisphere
 - b. clockwise in the northern hemisphere and clockwise in the southern hemisphere

- c. clockwise in the northern hemisphere and counterclockwise in the southern hemisphere
 - d. counterclockwise in the northern hemisphere and counterclockwise in the southern hemisphere
8. Wetlands
- a. are not very valuable and so are often filled in.
 - b. remove pollutants from water.
 - c. are low in biodiversity.
 - d. none of these.
9. Ocean currents bring
- a. surface water to the deep sea; deep water to the surface.
 - b. cool polar water to the equator; warm equatorial water to the polar regions
 - c. nutrients from the deep sea to the surface
 - d. all of these
10. About half of the world's primary productivity is provided by
- a. phytoplankton
 - b. kelp and seaweed
 - c. rainforest plants
 - d. zooplankton
11. Organisms that are endothermic, give birth to live young, and have kidneys that excrete salt are
- a. marine reptiles
 - b. marine amphibians
 - c. shorebirds
 - d. marine mammals
12. What percentage of the Earth's water is fresh water?
- a. 1%
 - b. 2%
 - c. 3%
 - d. 4%
13. What drives deep ocean circulation?
- a. downwelling
 - b. upwelling
 - c. thermohaline circulation
 - d. Coriolis effect
14. Tide pool organisms must be protected from
- a. the mix of fresh and salt water.
 - b. drying out.
 - c. intense predation.
 - d. all of these.
15. Chemosynthetic bacteria
- a. provide food to other organisms.
 - b. receive shelter from other organisms.
 - c. are part of the hydrothermal vent ecosystem.
 - d. all of these.

True or False

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

- _____ 16. Soil is an important reservoir for water.
- _____ 17. A tributary is the larger of two streams that join together.
- _____ 18. Flooding is a natural part of a river's behavior.
- _____ 19. With transpiration, trees takes up water from the soil and releases it into the air through their leaves.
- _____ 20. Streams come together at a confluence.
- _____ 21. Kelp forests are found in the littoral zone.
- _____ 22. Whales, dolphins and manatees are cetaceans.
- _____ 23. In wet areas, the top of a stream is also the top of the water table.
- _____ 24. Recharge into the Ogallala Aquifer is only about one-HALF the amount of draw down from pumping.
- _____ 25. The aphotic zone makes up the majority of the ocean.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

26. _____ occurs when water moves from wet to dry regions of soil.
27. Water vapor in the atmosphere becomes water droplets in a cloud by the process of _____.
28. H₂O in gaseous form is _____.
29. _____ is the time a water molecule stays in a reservoir.
30. _____ are consumers that float at the surface their whole lives.
31. The height of a(n) _____ increases as it nears the shore.
32. If a lot of water is pumped from an aquifer the water table will _____.
33. _____ are the daily rise and fall of sea level at any given place.
34. _____ are potentially dangerous currents that carry large amounts of water offshore quickly.
35. _____ have the smallest tidal range and occur when the Earth, Moon, and Sun form a 90° angle.

Short Answer

Answer each question in the space provided.

36. Draw a diagram of the water cycle and label the reservoirs and processes that connect them. What phase is water in in each of the reservoirs?

37. Describe the causes of floods and their effects.

38. Describe how wells access water. What can happen if a lot of wells are pumping from the same aquifer?

39. Describe the composition of ocean water.

40. Describe what causes tides. What are spring tides and neap tides?

Answer Key

1. d 2. a 3. b 4. b 5. c 6. a 7. c 8. b 9. d 10. a 11. d 12. c 13. c 14. b 15. d

16. true 17. false 18. true 19. true 20. false 21. false 22. false 23. true 24. false 25. true

26. Capillary action 27. condensation 28. water vapor 29. residence time 30. zooplankton 31. wave 32. fall (decline) 33. tides 34. rip currents 35. neap tide

36. See text, "The Water Cycle."

37. Floods usually occur when precipitation falls more quickly than that water can be absorbed into the ground or carried away by rivers or streams. Waters may build up gradually over a period of weeks, when a long period of rainfall or snowmelt fills the ground with water and raises stream levels. A flood may be really fast if the water is coming so fast that it runs rapidly off the ground. This is a flash flood.

Positive effects – deposits new nutrient-rich sediments when they flood, helping farming. Floods also move large amounts of sediments which provide habitats for animals.

Negative effects – can destroy homes, wipe out fields and crops, damage roads.

38. A well is created by digging or drilling to reach groundwater. When water is close to the surface, wells are convenient method for extracting water. They allow for access to water when no surface water is available. If too much water is taken, the ground may undergo subsidence. The aquifer may no longer have enough water to supply the needs of the people.

39. Salt makes up 3.5% of the mass of ocean water. Ocean water also contains chlorine, sodium, magnesium, sulfur, and calcium.

40. The pull of the moon's gravity on Earth causes tides. The sun's gravity is a secondary cause. When the sun and moon are lined up with Earth, at either the full moon or new moon, the tidal range is greatest and the tides are spring tides. When the sun and moon are at 90-degrees to each other relative to Earth, the tidal range is least and the tides are neap tides.}

27.7 Unit 7: Weather and Climate Test

Unit 7 chapters: *Earth's Atmosphere*, *Weather*, and *Climate*

- The answer keys can be found in the Resource tab above the Table of Contents.

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which of the following decreases with an increase in altitude?
 - a. air pressure
 - b. visibility
 - c. water vapor
 - d. none of the above
2. You are in a moist forest, thick with tall coniferous trees. Which biome are you probably in?
 - a. subpolar
 - b. humid continental
 - c. marine west coast
 - d. humid subtropical
3. Which appear thin and wispy?
 - a. Stratus
 - b. Nimbostratus
 - c. Altostratus
 - d. Cirrus
4. At autumnal equinox the sun is directly above
 - a. the Tropic of Capricorn
 - b. the Tropic of Cancer
 - c. the South Pole
 - d. the Equator
5. In which layer of the atmosphere does all weather take place?
 - a. Troposphere
 - b. Stratosphere
 - c. Mesosphere
 - d. Thermosphere
6. Which of the following is a measure of how fast atoms in a material are moving?
 - a. pressure
 - b. albedo
 - c. temperature
 - d. radiation
7. Thunderstorms form when
 - a. the ground is warm and updrafts form
 - b. ground temperature is higher than 28-degrees Centigrade

- c. a high pressure cell is over the area
 - d. lightning releases heat energy so the storm grows
8. Which of the following adds oxygen to the atmosphere?
- a. forest fires
 - b. photosynthesis
 - c. weathering of rocks
 - d. life processes of animals
9. What features does an air mass have nearly identical throughout?
- a. fog and humidity
 - b. pressure and temperature
 - c. pressure and humidity
 - d. temperature and humidity
10. Which weather phenomena is the most deadly per year?
- a. hurricane
 - b. heat wave
 - c. tornado
 - d. blizzard
11. If the readings on your barometer fall,
- a. a change in weather is coming
 - b. storm clouds are probably on the way
 - c. clear skies are probably coming
 - d. you don't know anything about the future; barometers can't be used to predict weather
12. A squall line is
- a. the line where cold air transitions to warm air at a warm front.
 - b. the location where a cold front catches up to a warm front, resulting in cold, warm and then cold.
 - c. the location where a front stops and remains stationary.
 - d. a line of thunderstorms along a cold front.
13. Outside one morning the plants are coated with water but it didn't rain. The wetness is because
- a. a fog came in over night.
 - b. an inversion caused water to condense on the plants.
 - c. the air near the plants cooled to below its dew point.
 - d. this couldn't happen. It must have rained.
14. El Niño events
- a. occur when ocean temperatures get high.
 - b. cause the trade winds to reverse direction or stop.
 - c. stop upwelling off of western South America.
 - d. all of these
15. Carbon dioxide levels in the atmosphere
- a. have been rising at least since 1958
 - b. rose in the 1950s and 1960s, but are now stable
 - c. have been declining since around 1972
 - d. none of these

True or False

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

- _____ 16. The sun is the source of heat for the troposphere.
- _____ 17. Many characteristics of a storm can be mapped using radar.
- _____ 18. Pilots prefer to fly in the stratosphere because of the lack of turbulence.
- _____ 19. As temperature decreases, relative humidity decreases.
- _____ 20. The thermosphere contains the ozone layer.
- _____ 21. Water has a high specific heat.
- _____ 22. Ozone is the only atmospheric gas that filters out some wavelengths of solar radiation.
- _____ 23. UVC causes sunburns and is dangerous to plants when it reaches the Earth's surface.
- _____ 24. Each layer of the atmosphere is different because it has a different temperature gradient.
- _____ 25. A continental climate has a greater difference in temperature between day and night than a maritime climate.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

26. The low pressure zone near the equator where Hadley Cells meet is the _____.
27. In _____ tropical rainforest is cleared and burned and then farmed until the soil is no longer fertile.
28. Winds blow from _____ pressure zones to _____ pressure zones.
29. A(n) _____ is an uphill airflow.
30. The planet is divided into _____ major climate groups.
31. Lines of equal pressure are called _____.
32. Relatively warm air on the cold ground may lead to _____.
33. In a(n) _____ the air mass does not move.
34. _____ describes what the atmosphere is like at a specific time and place.
35. _____ is the measure of how well a surface reflects light.

Short Answer

Answer each question in the space provided.

36. What is the effect of there being more solar radiation striking at the equator than toward the poles?

37. Describe the greenhouse effect. Why is greenhouse effect so important to life on Earth?

38. How and under what conditions does a hurricane form?

39. What happens when air masses meet?

40. Climate has changed throughout Earth history. Why is climate change dangerous now?

Answer Key

1. a 2. c 3. d 4. d 5. a 6. c 7. a 8. b 9. c 10. b 11. b 12. d 13. c 14. d 15. a

16. false 17. true 18. true 19. false 20. false 21. true 22. false 23. false 24. true 25. true
26. Intertropical Convergence Zone 27. slash-and-burn agriculture 28. high; low 29. valley breeze 30. five 31. isobars 32. fog 33. stationary front 34. weather 35. albedo
36. There is more solar energy at the equator, which heats the air there. The air rises, which leads to convection cells. Advection at the base of the cells, along with Coriolis effect, determine the direction of the prevailing global winds.
37. The warming of the atmosphere because of insulation by greenhouse gases. Greenhouse gases moderate the earth's temperature.
38. When sea surface temperature reaches 28-degrees C or higher a low pressure cell, or tropical depression forms. Air rotates around the low pressure and the air in the center rises. This air cools, condenses and releases latent heat. If wind shear is low, the storm becomes a hurricane in two to three days.
39. A front develops which can bring winds, condensation, and precipitation. It can include stormy weather.
40. Earth has been warmer during much of its history. But people have built systems that depend on climate being the way it is now. Much development and many people are located at the coasts, which will be submerged as sea level rises. Species and ecosystems that keep the planet as we know it depend on current conditions. Conditions need to be good where farmland is prevalent. }

27.8 Unit 8: The Environment and Human Actions Test

Unit 8 chapters: *Ecosystems and Human Populations*, *Human Actions and the Land*, *Human Actions and Earth's Resources*, *Human Actions and Earth's Water*, and *Human Actions and the Atmosphere*

- The answer keys can be found in the Resource tab above the Table of Contents.

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. Which type of relationship does a bee have with a flower that it is pollinating?
 - a. Commensalism
 - b. Parasitism
 - c. Mutualism
 - d. None of the above
2. Which of the following had the single greatest impact on allowing humans to increase their carrying capacity?
 - a. raising livestock
 - b. building shelter
 - c. making tools
 - d. farming
3. Carbon sinks include
 - a. forests, oceans, the atmosphere
 - b. volcanic eruptions
 - c. fossil fuels being burned
 - d. igneous and metamorphic rocks
4. Toxic chemicals, flammable compounds, and substances that cause dangerous chemical reactions are all
 - a. cancer causing
 - b. hazardous wastes
 - c. illegal in the United States
 - d. all of these
5. To conserve resources, we should all
 - a. reduce consumption
 - b. reuse products when we can
 - c. recycle materials
 - d. all of these
6. Which of the following is a product of aquaculture?
 - a. shellfish
 - b. potatoes
 - c. golf courses
 - d. clean, safe water
7. The net-energy ratio of solar energy is 5.8 and of petroleum is 4.9. This means that
 - a. solar energy is cheaper to use than petroleum.

- b. more usable energy is obtained per unit of solar than of petroleum.
 - c. the overall energy loss is greater for solar than for petroleum.
 - d. all of these.
8. Which of the following can increase the conservation of water?
- a. Convert to more efficient methods of irrigation
 - b. Reduce household demand
 - c. water lawns less
 - d. all of the above
9. The best way to be sure energy resources will continue to be available is to
- a. develop new sources of fossil fuels.
 - b. develop new alternative energy sources.
 - c. conserve energy.
 - d. develop nuclear fusion.
10. Clean, safe water is
- a. available to about one-fifth of all the world's people.
 - b. going to become available to more people in the coming decades.
 - c. available to nearly all of the world's people.
 - d. none of these.
11. The ozone hole is caused by
- a. photochemically produced ozone.
 - b. ozone-destroying chemicals in the stratosphere.
 - c. CFCs on polar stratospheric clouds near the north pole.
 - d. none of these.
12. World Health Organization estimates how many people per year die from complications caused by air pollution?
- a. 2 million
 - b. 12 million
 - c. 22 million
 - d. 200 million
13. Most ocean pollution comes from
- a. oil spills
 - b. ships at sea
 - c. acid rain
 - d. land
14. Which soil layer is the most likely to erode?
- a. topsoil
 - b. A Horizon
 - c. B Horizon
 - d. bedrock
15. A cap-and-trade system provides a monetary incentive
- a. to individuals to conserve energy.
 - b. to nations to develop conservation strategies and technologies.
 - c. to regions to reduce carbon dioxide emissions by promoting conservation.
 - d. none of these.

True or False

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

- _____ 16. When glaciers retreat, the sea level falls.
- _____ 17. Climate determines the ecosystem within a given area.
- _____ 18. Producers are the food energy for many other organisms.
- _____ 19. Incandescent light bulbs are the most energy efficient.
- _____ 20. To reduce energy use, it is important to get as much work out of a unit of energy as possible.
- _____ 21. The cost of a resource depends on its availability, the cost of extracting and delivering it and the politics of the situation.
- _____ 22. A vulture is an example of a scavenger.
- _____ 23. Charles Darwin predicted the human population would continue to grow until we have exhausted all of our resources.
- _____ 24. Wildlife is always a renewable resource.
- _____ 25. The largest cause of soil erosion is agriculture.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

26. _____ is a government program to identify and fund the cleanup of extremely hazardous waste sites.
27. Nitrogen in fertilizer causes algae to grow because that nutrient is a(n) _____.
28. The energy level within a food chain is known as the _____.
29. _____ of resources, particularly by developed nations, is unsustainable in the long term.
30. Earth's supply of petroleum will be used up in decades meaning that it is a _____ resource.
31. The total amount of energy that is possible to extract from a resource is the _____.
32. The small island nation of Tuvalu with few natural resources must _____ nearly all of its goods.
33. If we do not reduce carbon emissions, we may develop geoengineering to remove carbon from the atmosphere known as _____.
34. Organisms that can lead to diseases are known as _____.
35. Most cities have plants that process _____ to remove contaminants from wastewater.

Short Answer

Answer each question in the space provided.

36. Explain the difference between niche and habitat.
37. What can be done to reduce soil erosion on farmland?

38. For alternative energy sources like solar, wind and biofuels to replace fossil fuels, what would need to happen?

39. What has happened to water use in the past 100 years in developed and developing nations? What is predicted to happen to water use in the next 50?

40. How can people reduce air pollution?

Answer Key

1. c 2. d 3. a 4. b 5. d 6. a 7. b 8. d 9. c 10. a 11. b 12. c 13. d 14. a 15. b
16. false 17. true 18. true 19. false 20. true 21. true 22. true 23. false 24. false 25. true
26. Superfund 27. limiting factor 28. trophic level 29. over-consumption 30. non-renewable 31. net energy 32. import 33. carbon sequestration 34. pathogen 35. sewage
36. Niche is the way a species makes a living. For example: A bat eats mosquitoes. Habitat is the place where a species lives. Example: bats live in cracks and crevices or bat houses.
37. Open land erodes easily so land should be covered as much as possible. This could be done by leaf litter or cover crops in off seasons. Tall trees around fields can buffer the wind. Tractors break up soil and make it vulnerable to erosion so they should be used as little as possible. Placing irrigation water where it is needed keeps excess water from eroding soil. Flat fields are not vulnerable to erosion by gravity.
38. More research and development is needed to bring the costs of alternative energy sources down to be more in line with fossil fuels. Also, the costs of environmental damage should be weighed. It is not fair to say that oil costs only the amount it takes to deliver it to the consumer. It's costs are far greater in healthcare costs, and damage to the environment. Climate change will be extremely costly to deal with so that needs to be considered.
39. In developed nations, people use much more water than they did 100 years ago. People in developed nations use an enormous proportion of the world's water compared with those in developing nations. In the next 50 years, there will be more people in developing nations that do not have access to clean, safe water unless enormous advancements are made in getting such water to them.
40. Drive less, taking a bus or carpooling, buying cars with better fuel efficiency, turning off lights and appliances when not in use, using energy efficient lights and appliances, and buying fewer items manufactured with fossil fuels.}

27.9 Unit 9: Astronomy Test

Unit 9 chapter: *Observing and Exploring Space, Earth, Moon, and Sun, The Solar System, and Stars, Galaxies, and the Universe*

- The answer keys can be found in the Resource tab above the Table of Contents.

Name _____ Class _____ Date _____

Multiple Choice

Circle the letter of the correct choice.

1. A rocket moves in space because the action force of the engines
 - a. thrusts in a forward motion against the atmosphere
 - b. causes a temperature differential on top and bottom of the rocket propelling it forward
 - c. creates a reaction force of the gases on the rocket
 - d. none of these
2. What is the shape of Earth's path around the Sun?
 - a. square
 - b. circle
 - c. sphere
 - d. ellipse
3. Which layer of the Sun is the part that we see?
 - a. core
 - b. chromosphere
 - c. photosphere
 - d. corona
4. When the new moon passes directly between Earth and the Sun, what occurs?
 - a. solar eclipse
 - b. neap tides
 - c. lunar eclipse
 - d. none of these
5. Who was the first man to set foot on the moon?
 - a. James Lovell
 - b. Buzz Aldrin
 - c. Neil Armstrong
 - d. Edward Hubble
6. The Sun is made of
 - a. hydrogen and helium gas
 - b. hydrogen and a little helium in the form of plasma
 - c. helium gas and some rock and metal in the core
 - d. burning metal and gas
7. Who invented the first reflecting telescope?
 - a. Edward Hubble

- b. Sir Isaac Newton
 - c. Galileo Galilei
 - d. Johannes Kepler
8. Why are elliptical galaxies typically reddish?
- a. they are blue shifted towards Earth
 - b. they contain older stars
 - c. there is nebular gas within them
 - d. they contain newer stars
9. Which planetary body has felsic highlands surrounded by mafic basalt lavas?
- a. Moon
 - b. Mercury
 - c. Venus
 - d. Mars
10. According to the nebular hypothesis, the solar system formed
- a. from the collapse of a giant cloud of gas and dust
 - b. in a supernova explosion
 - c. in the first few minutes after the Big Bang
 - d. none of these
11. Who first observed that an object can orbit something besides Earth?
- a. Copernicus
 - b. Galileo
 - c. Ptolemy
 - d. Einstein
12. Which of the following is NOT part of the definition of a planet?
- a. Must orbit a star.
 - b. Must have enough gravity that it is spherical.
 - c. Must have cleared its orbit of debris.
 - d. Must have water.
13. To learn about the material that makes up the interiors of planets, scientists study
- a. volcanic rocks
 - b. the surface of the Moon
 - c. meteorites
 - d. the solar wind
14. Spherical groups of old stars tightly held together by gravity are
- a. nebulae
 - b. galaxies
 - c. open clusters
 - d. globular clusters
15. Evidence for the Big Bang includes that the universe is expanding and there is
- a. a small amount of heat remaining
 - b. a small amount of reverberating sound remaining
 - c. blueshift of the farthest out galaxies
 - d. none of these

True or False

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

- _____ 16. The Earth has seasons because of its elliptical orbit around the Sun.
- _____ 17. The Earth's crust is made up of about 75% iron which produces strong magnetic fields.
- _____ 18. A satellite in a geostationary orbit hovers over the same position on Earth.
- _____ 19. Galileo invented the first telescope.
- _____ 20. All of the spacecraft we have sent out for exploration are within our solar system.
- _____ 21. When you observe a galaxy far, far away you are seeing what it looked like billions of years ago.
- _____ 22. Radio telescopes are best used to study objects within our solar system.
- _____ 23. Space-based telescopes provide clearer views of the planets and other stars.
- _____ 24. The Universe began about 13.7 billion years ago and the Solar System about 5 billion years ago.
- _____ 25. You would weigh one-sixth of your current weight on the moon.

Fill in the Blanks

Fill in the blank with the term that best completes the sentence.

26. The _____ is an enormous, oval-shaped storm on Jupiter.
27. Most of the solar system's mass is in _____ .
28. When Moon and Sun are on opposite sides of Earth the tides will be _____.
29. For there to be weather, a planet or satellite must have a(n) _____
30. During a solar eclipse, Earth falls into the _____ of the moon.
31. At the center of many galaxies is a(n) _____.
32. Sunspots occur in _____ year cycles.
33. Moving a rocket through space requires _____.
34. All galaxies and stars that we observe appear to have a _____ in their light spectra.
35. The _____ model places the Sun at the center of the solar system.

Short Answer

Answer each question in the space provided.

36. List the terrestrial planets and describe their common characteristics.

37. What did Galileo observe with his telescope that changed the way people thought about the solar system and why?

38. Explain the difference between asteroids, meteoroids, and comets.

39. Why is Pluto now considered a dwarf planet?

40. What started the space race? How did the United States react?

Answer Key

1. c 2. d 3. d 4. a 5. c 6. b 7. b 8. b 9. a 10. a 11. b 12. d 13. c 14. d 15. a

16. false 17. false 18. true 19. true 20. false 21. true 22. false 23. true 24. true 25. true

26. Great Red Spot 27. the Sun 28. spring tides 29. atmosphere 30. umbra 31. black hole 32. 11 33. thrust 34. red shift 35. heliocentric model

36. Mercury, Venus, Earth and Mars – all have a crust, mantle and core. All have been geologically active at some point. All are made of igneous rocks with iron cores. None of them have rings.

37. Galileo observed that Venus has phases, suggesting that it too orbits the Sun. He saw that Jupiter has moons orbiting it, suggesting that other bodies in the solar system can have satellites. He took these observations in support of the Copernican model of the solar system that said that the Sun is at the center and the planets orbit around it.

39. Asteroids are small rocky bodies that orbit the Sun, meteoroids are smaller than asteroids, and comets are small, icy objects that have very elliptical orbits around the sun. Comets orbits carry them from the outer solar system to the inner solar system.

39. While it orbits a star and has enough mass to be nearly spherical, it has not cleared its orbit of smaller objects thus no longer fulfilling the definition of planet which was adopted in 2006.

40. The USSR launched Sputnik on Oct. 4, 1957 which was the first artificial satellite in orbit. This shocked Americans and they responded by launching Explorer 1 on Jan. 31, 1958. NASA was established in 1958. The space race reached its peak in 1969 when the US put the first man on the moon.}