

HOLT

Earth Science

Study Guide



HOLT, RINEHART AND WINSTON

A Harcourt Education Company

Orlando • Austin • New York • San Diego • Toronto • London

Copyright © by Holt, Rinehart and Winston

All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the publisher.

Teachers using HOLT EARTH SCIENCE may photocopy blackline masters in complete pages in sufficient quantities for classroom use only and not for resale.

HOLT and the “**Owl Design**” are trademarks licensed to Holt, Rinehart and Winston, registered in the United States of America and/or other jurisdictions.

Printed in the United States of America

ISBN 0-03-036346-2

1 2 3 4 5 6 054 08 07 06 05 04

Contents

Introduction to Earth Science	1
Earth as a System	3
Models of the Earth	5
Earth Chemistry	7
Minerals of Earth's Crust	9
Rocks	11
Resources and Energy	13
The Rock Record	15
A View of Earth's Past	17
Plate Tectonics	19
Deformation of the Crust	21
Earthquakes	23
Volcanoes	25
Weathering and Erosion	27
River Systems	29
Groundwater	31
Glaciers	33
Erosion by Wind and Waves	35

The Ocean Basins	37
Ocean Water	39
Movements of the Ocean	41
The Atmosphere	43
Water in the Atmosphere	45
Weather	47
Climate	49
Studying Space	51
Planets of the Solar System	53
Minor Bodies of the Solar System	55
The Sun	57
Stars, Galaxies, and the Universe	59

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|-------------------------------|--|
| _____ 1. hypothesis | a. process of obtaining information by using the senses |
| _____ 2. theory | b. process by which experts in a field examine another expert's work prior to publication |
| _____ 3. geology | c. scientific study of the oceans |
| _____ 4. independent variable | d. explanation that is based on observations and that can be tested |
| _____ 5. dependent variable | e. factor that is manipulated in an experiment |
| _____ 6. astronomy | f. scientific study of the universe |
| _____ 7. meteorology | g. factor in an experiment that changes as a result of changes in other factors |
| _____ 8. oceanography | h. scientific study of Earth's atmosphere |
| _____ 9. observation | i. scientific study of the origin, history, and structure of Earth |
| _____ 10. peer review | j. explanation of a phenomenon based on observation, experimentation, and reasoning; supported by a large amount of evidence |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. How does science differ from art, architecture, and philosophy?
- a. The goal of science is human endeavor.
 - b. Science takes more mental energy.
 - c. Science is the same as these other endeavors.
 - d. The goal of science is to explain natural phenomena.
- _____ 12. In their scientific study of Earth, what did the ancient Chinese do?
- a. record time
 - b. keep accurate records of births and deaths
 - c. keep records of earthquakes
 - d. invent electricity

Concept Review *continued*

- _____ **13.** What is Earth science?
- a.** the scientific study of chemical mixtures
 - b.** the scientific study of Earth and the universe around it
 - c.** the scientific study of animal behavior
 - d.** the scientific study of life on Earth
- _____ **14.** In the scientific process, forming a hypothesis is often immediately followed by what step?
- a.** publishing the results in a scientific journal
 - b.** conducting a peer review of the hypothesis
 - c.** testing the hypothesis by conducting an experiment
 - d.** drawing conclusions about the hypothesis
- _____ **15.** Which of the following is true about the impact of science on society?
- a.** New technology created by science sometimes causes problems.
 - b.** The impact of science on society is always positive.
 - c.** Scientific knowledge does not help us understand our world.
 - d.** Science never has any impact on society.
- _____ **16.** If experimental results do not support a hypothesis, what may happen?
- a.** The hypothesis will become a theory.
 - b.** The hypothesis may be changed or discarded.
 - c.** The hypothesis will be published in a scientific journal.
 - d.** The scientist who developed it may resign his position.
- _____ **17.** What area of Earth science is likely to involve the study of climate?
- a.** geology
 - b.** biology
 - c.** astrology
 - d.** meteorology
- _____ **18.** By tracking celestial movements, the ancient Maya were able to
- a.** create accurate calendars.
 - b.** invent astrology.
 - c.** develop the scientific process.
 - d.** figure out geometry.
- _____ **19.** What do scientists use to simulate conditions in the natural world?
- a.** trial and error
 - b.** conceptual and physical models
 - c.** geology and meteorology
 - d.** books and records
- _____ **20.** Scientific measurement is based on
- a.** precision and accuracy.
 - b.** climate and weather conditions.
 - c.** independent and dependent variables.
 - d.** trial and error.

Concept Review

MATCHING

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|------------------------|---|
| _____ 1. asthenosphere | a. the solid, outer layer of Earth that consists of the crust and the rigid upper part of the mantle |
| _____ 2. atmosphere | b. the solid, plastic layer of the mantle beneath the lithosphere; made of mantle rock that flows very slowly, which allows tectonic plates to move on top of it |
| _____ 3. lithosphere | c. the thin and solid outermost layer of Earth above the mantle |
| _____ 4. system | d. the central part of Earth below the mantle |
| _____ 5. core | e. a mixture of gases that surrounds a planet or moon |
| _____ 6. hydrosphere | f. the part of Earth where life exists; includes all of the living organisms on Earth |
| _____ 7. biosphere | g. the layer of rock between Earth's crust and core; denser than the crust |
| _____ 8. mantle | h. the portion of Earth that is water |
| _____ 9. crust | i. the mostly solid, rocky part of Earth; extends from the center of the core to the surface of the crust |
| _____ 10. geosphere | j. a set of particles or interacting components considered to be a distinct physical entity for the purpose of study |

MULTIPLE CHOICE

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. The "middle sphere," the strong, lower part of the mantle between the asthenosphere and the outer core is called the
- | | |
|-----------------------|-----------------------|
| a. biosphere. | c. geosphere. |
| b. mesosphere. | d. atmosphere. |
- _____ 12. A system in which both energy and matter are exchanged with the surroundings is called a(n)
- | | |
|------------------------|--------------------------|
| a. open system. | c. closed system. |
| b. life system. | d. free system. |

Concept Review *continued*

- _____ **13.** All of the following are processes through which Earth's energy and matter passes EXCEPT the
- a. phosphorus cycle.
 - b. nitrogen cycle.
 - c. oxygen cycle.
 - d. carbon cycle.
- _____ **14.** What are the Earth's pole-to-pole circumference and equatorial circumference measurements?
- a. 4,000 km, 40,700 km
 - b. 7,000 km, 7,4000 km
 - c. 70,000 km, 40,700 km
 - d. 40,007 km, 40,074 km
- _____ **15.** The force of attraction between any two objects depends on the masses of the objects and the distance between them, according to
- a. the law of magnetism.
 - b. Newton's law of gravitation.
 - c. the law of the magnetosphere.
 - d. the law of plasticity.
- _____ **16.** Earth's shape is a(n)
- a. oblate spheroid.
 - b. oval.
 - c. perfect circle.
 - d. circular spheroid.
- _____ **17.** A community of organisms and their abiotic environment is called a(n)
- a. ecological system.
 - b. life cycle.
 - c. biological system.
 - d. ecosystem.
- _____ **18.** The possible source of Earth's magnetic core is
- a. Earth's ionized atmosphere.
 - b. the movement of the tides.
 - c. the liquid iron in its outer core.
 - d. friction created by rotation.
- _____ **19.** What can happen to energy as it passes through an ecosystem?
- a. It can be lost.
 - b. It can be unchanged.
 - c. It can increase.
 - d. It can change form.
- _____ **20.** Which factors do NOT control the balance of an ecosystem?
- a. producers
 - b. consumers
 - c. decomposers
 - d. creators

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|---------------------------------|---|
| _____ 1. elevation | a. angular distance east or west from the prime meridian |
| _____ 2. latitude | b. size and shape of the land surface features of a region including relief |
| _____ 3. conic projection | c. used to plot great circle routes used in air travel |
| _____ 4. magnetic declination | d. angular distance north or south of the equator |
| _____ 5. longitude | e. angle between the direction of the geographic pole and the direction a magnetic compass needle points |
| _____ 6. topography | f. height of land above sea level |
| _____ 7. legend | g. used to produce a series of adjoining maps to make one continuous map |
| _____ 8. cylindrical projection | h. accurate near the equator, but distorted near the poles; parallels and meridians form a grid |
| _____ 9. azimuthal projection | i. the relationship between the distance shown on a map and the actual distance |
| _____ 10. scale | j. a list of map symbols and their meanings |

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

- _____ 11. What are two ways scientists get data to make maps?
- a.** field surveys and remote control
 - b.** word of mouth and legend
 - c.** field surveys and remote sensing
 - d.** books and the internet
- _____ 12. Soil maps are used to
- a.** show natural features and constructed features.
 - b.** show direction of the flow of groundwater and identify locations for waste disposal sites.
 - c.** record and predict weather events and plot precipitation.
 - d.** identify ways to conserve soil and plan sites for future development.

Concept Review *continued*

- _____ **13.** A magnetic compass indicates direction because
- a.** Earth has magnetic properties.
 - b.** geographic and geomagnetic directions are the same.
 - c.** everyone agrees which direction is north.
 - d.** a bar-shaped magnet is buried at Earth's center.
- _____ **14.** What types of information do geologic maps show?
- a.** distribution of climatologic features
 - b.** distribution of geographic features
 - c.** distribution of geologic features
 - d.** distribution of topographic features
- _____ **15.** Each degree of latitude consists of
- a.** 60 angles.
 - b.** 60 hours.
 - c.** 60 seconds.
 - d.** 60 minutes.
- _____ **16.** What is a compass rose?
- a.** a symbol indicating the 0° meridian
 - b.** a symbol that indicates the cardinal directions
 - c.** a symbol that shows the relationship of map distance to real distance
 - d.** a symbolic decoration
- _____ **17.** any circle running east and west around the earth, parallel to the equator is a
- a.** north-south circle.
 - b.** meridian.
 - c.** parallel.
 - d.** line of longitude.
- _____ **18.** A geologic unit is a(n)
- a.** amount of rock that fills a specific space.
 - b.** area that covers a quadrant on a map.
 - c.** volume of rock of the same type and age range.
 - d.** single rock.
- _____ **19.** What is the only line of latitude that is a great circle?
- a.** the prime meridian
 - b.** the equator
 - c.** 60°N latitude
 - d.** the arctic circle
- _____ **20.** On a map, a contour line is
- a.** a line that connects points of equal elevation.
 - b.** a line that surrounds a geographic point.
 - c.** a line between two points on the equator.
 - d.** a line that is the longest distance between two points.

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|---------------------------------|--|
| _____ 1. chemical properties | a. the number of protons in the nucleus of an atom |
| _____ 2. ion | b. the sum of the number of protons and neutrons in an atom |
| _____ 3. isotope | c. subatomic particle that has a positive charge |
| _____ 4. neutron | d. unit of measure for the mass of subatomic particles |
| _____ 5. electron | e. atom or molecule that has a negative or positive charge |
| _____ 6. atomic mass unit (amu) | f. characteristics that describe how a substance reacts with other substances to make new substances |
| _____ 7. physical properties | g. characteristics that can be observed without changing the substance |
| _____ 8. atomic number | h. subatomic particle that has no charge, located in the nucleus |
| _____ 9. proton | i. subatomic particle that has a negative charge |
| _____ 10. mass number | j. atom with the same number of protons but a different number of neutrons as other atoms of the same element |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. What is one way elements in the periodic table are arranged?
- a.** in numerical order, heaviest first
 - b.** in alphabetical order
 - c.** in order of atomic number
 - d.** in order of number of neutrons
- _____ 12. What are the three major types of subatomic particles?
- a.** proton, neutron, electron
 - b.** nucleus, proton, byte
 - c.** quark, neutron, proton
 - d.** positron, neuron, electron

Concept Review *continued*

- _____ **13.** What is true of elements in the same column on the periodic table?
- They have different arrangements of electrons.
 - They have similar arrangements of electrons.
 - They have similar arrangements of neutrons.
 - They have different arrangements of neutrons.
- _____ **14.** What is a compound?
- a substance made of physically bound atoms of two or more different elements
 - a substance made of chemically bound atoms of two or more different elements
 - any substance made of subatomic particles fused together
 - two or more elements magnetically bound
- _____ **15.** How do atoms form chemical bonds?
- by sharing or transferring electrons
 - by mixing chemical solutions
 - by sharing or transferring neutrons
 - through magnetism
- _____ **16.** What is an alloy?
- a solution of nonmetals
 - metals melted together
 - a heterogeneous mixture
 - a solution of two or more metals
- _____ **17.** What does the subscript mean in the chemical formula CO_2 ?
- two atoms of carbon
 - two protons
 - two atoms of carbon dioxide
 - two atoms of oxygen
- _____ **18.** What is the smallest unit of matter that exists by itself and keeps all of the chemical properties of a substance?
- atom
 - proton
 - molecule
 - compound
- _____ **19.** What is true of an atom with 8 valence electrons?
- It is reactive.
 - It is missing some electrons.
 - It is stable.
 - It has more electrons than it needs.
- _____ **20.** What is a mixture?
- a solution
 - two or more substances not chemically combined
 - two or more substances chemically combined
 - a compound

Skills Worksheet

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|------------------------|--|
| _____ 1. fracture | a. the way in which a mineral reflects light |
| _____ 2. streak | b. the tendency of a mineral to form smooth, flat surfaces along breaks |
| _____ 3. radioactivity | c. the ability of a mineral to glow under ultraviolet light |
| _____ 4. density | d. the color of a mineral in powdered form |
| _____ 5. magnetism | e. the way in which a mineral breaks along irregular or curved surfaces |
| _____ 6. chatoyancy | f. the cat's eye effect in minerals |
| _____ 7. cleavage | g. the ratio of mass to volume in a substance |
| _____ 8. fluorescence | h. the appearance of a six-sided star shape when a mineral reflects light |
| _____ 9. luster | i. the decay of a mineral's unstable atomic nuclei over time |
| _____ 10. asterism | j. the ability of a mineral to attract iron |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Which of the following describes silicate crystalline structures?
- a.** single-sheet, cubic, prisms
 - b.** double-chain, hexagonal, tetrahedron
 - c.** sheet, isolated, ring
 - d.** cubic, hexagonal prisms, irregular
- _____ 12. A framework silicate is one in which
- a.** each tetrahedron is bonded to four others.
 - b.** each tetrahedron is bonded to two others.
 - c.** four tetrahedra are bonded to four others.
 - d.** each tetrahedron is bonded to six others.
- _____ 13. A mineral is a natural, inorganic solid that has characteristic chemical composition,
- a.** an orderly internal structure, and characteristic physical properties.
 - b.** silicate structure, and consistent chemical properties.
 - c.** nonsilicate structure, and consistent physical properties.
 - d.** a disorderly internal structure, and unidentifiable physical properties.

Concept Review *continued*

- _____ **14.** Color is unreliable for identifying minerals because
- a.** most minerals have similar colors.
 - b.** small amounts of other elements affect color, but weathered surfaces will reveal color.
 - c.** small amounts of other elements affect color, and weathered surfaces may hide color.
 - d.** most minerals are virtually colorless.
- _____ **15.** What is the ability of a mineral to resist scratching called?
- a.** asterism
 - b.** streak
 - c.** density
 - d.** hardness
- _____ **16.** A silicate mineral contains a combination of
- a.** silicon and carbon.
 - b.** silicon and oxygen.
 - c.** hardness and density.
 - d.** silicon and sulfates.
- _____ **17.** A nonsilicate mineral is one that does not contain compounds of
- a.** sulfates and sulfides.
 - b.** oxygen.
 - c.** sodium or calcium.
 - d.** silicon and oxygen.
- _____ **18.** What is true of single-chain, double-chain, and framework arrangements?
- a.** They are all types of silicate crystalline structures.
 - b.** They are all types of nonsilicate crystalline structures.
 - c.** They are not types of silicate crystalline structures.
 - d.** They are all unstable nuclei structures.
- _____ **19.** Which are common nonsilicate crystalline structures?
- a.** cubes, hexagonal prisms, irregular masses
 - b.** sheets, isolated tetrahedra, rings
 - c.** single-chains, hexagonal prisms, rings
 - d.** rings, chains, links
- _____ **20.** What is true of the ions at the center of nonsilicate tetrahedra?
- a.** They are oxygen ions.
 - b.** They are not silicon ions.
 - c.** They are silicon ions.
 - d.** They are carbon ions.

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|--------------------------------------|---|
| _____ 1. clastic
sedimentary rock | a. the process in which one type of rock changes into metamorphic rock because of chemical processes or changes in temperature and pressure |
| _____ 2. Bowen's reaction series | b. rock that forms from the cooling and solidification of lava at Earth's surface |
| _____ 3. intrusive igneous rock | c. the simplified pattern that illustrates the order in which minerals crystallize from cooling magma according to their chemical composition and melting point |
| _____ 4. chemical sedimentary rock | d. rock that forms when minerals precipitate from a solution or settle from a suspension |
| _____ 5. extrusive igneous rock | e. rock that forms when rock fragments are compacted and cemented together |
| _____ 6. cementation | f. the process in which the volume and porosity of a sediment is decreased by the weight of overlying sediments as a result of burial beneath other sediments |
| _____ 7. organic sedimentary rock | g. rock formed from the cooling and solidification of magma beneath Earth's surface |
| _____ 8. compaction | h. the process in which minerals precipitate into pore spaces between sediment grains and bind sediments together to form rock |
| _____ 9. metamorphism | i. the series of processes in which rock forms and changes by geological processes |
| _____ 10. rock cycle | j. rock that forms from the remains of animals or plants |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Which of the following rocks is foliated?
- a. marble
 - b. quartzite
 - c. gneiss
 - d. obsidian

Concept Review *continued*

- _____ **12.** Which of the following is NOT one of the three major types of rocks?
a. sedimentary: formed from compressed sediment deposits
b. igneous: formed from cooled magma
c. obsidian: formed from rock that has small crystals; like glass
d. metamorphic: formed when existing rock is altered
- _____ **13.** Which of the following does NOT affect the stability of rocks?
a. chemical bonds between atoms in the minerals
b. zones of weakness
c. chemical and physical weathering
d. the intensity of color
- _____ **14.** Which of the following is NOT an igneous rock texture?
a. fine-grained
b. vesicular
c. felsic
d. coarse-grained
- _____ **15.** Which of the following factors does NOT affect how rock melts?
a. light
b. pressure
c. temperature
d. presence of fluids in rock
- _____ **16.** What causes rock to change in regional metamorphism?
a. Rock changes result from changes in temperature and pressure.
b. Rock changes result from contact with nonfoliated rock.
c. Rock remains unchanged after regional metamorphism occurs.
d. Rock changes result from contact with magma.
- _____ **17.** The process by which different minerals in rock melt at different times is called
a. compositional melting.
b. partial melting.
c. Bowen's reaction series
d. metamorphism.
- _____ **18.** A common zone of weakness in rocks is called
a. weathering.
b. composition.
c. a joint.
d. a chemical bond.
- _____ **19.** Magma or igneous rock that is rich in feldspar and silica is
a. porphyritic.
b. felsic.
c. glassy.
d. mafic.
- _____ **20.** Which of the following is NOT a feature of sedimentary rock?
a. stratification
b. fossils
c. cross-beds
d. marble

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|-------------------------------|---|
| _____ 1. biomass | a. has interconnected spaces through which liquids can flow |
| _____ 2. ore | b. is used in an active solar system |
| _____ 3. geothermal energy | c. comes from organic matter such as plant material and paper waste |
| _____ 4. solar collector | d. contains minerals that can be removed from it profitably |
| _____ 5. fossil fuel | e. is produced by heat within Earth |
| _____ 6. hydroelectric energy | f. can be found on the deep-ocean floor |
| _____ 7. anthracite | g. is made of liquid hydrocarbons |
| _____ 8. permeable rock | h. is the hardest form of coal |
| _____ 9. nodule | i. is produced by running water |
| _____ 10. petroleum | j. was formed from the remains of living organisms |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. The process that produces coal deposits is
- a. nuclear fission.
 - b. placer mining.
 - c. carbonization.
 - d. contact metamorphism.
- _____ 12. What is the process by which the nucleus of a heavy atom splits, releasing neutrons and energy?
- a. nuclear fusion
 - b. solar energy
 - c. electrical generation
 - d. nuclear fission
- _____ 13. Hydrothermal solutions moving through small cracks in rock may create
- a. ore deposits.
 - b. placer deposits.
 - c. nodules.
 - d. lignite.

Concept Review *continued*

- _____ **14.** A process that lessens the negative effects of mining on the environment is
- a.** contact metamorphism.
 - b.** reclamation.
 - c.** surface mining.
 - d.** carbonization.
- _____ **15.** An example of a valuable nonmetallic mineral is
- a.** ore.
 - b.** copper.
 - c.** a gemstone.
 - d.** a native element.
- _____ **16.** A favorable location for a wind farm is a
- a.** river.
 - b.** mountain pass.
 - c.** rainforest.
 - d.** city.
- _____ **17.** Fossil fuels consist primarily of
- a.** anthracite.
 - b.** metals.
 - c.** gypsum.
 - d.** hydrocarbons.
- _____ **18.** A substance that can be obtained through placer mining is
- a.** coal.
 - b.** petroleum.
 - c.** gold.
 - d.** oil shale.
- _____ **19.** The purpose of a catalytic converter is to
- a.** reduce air pollution caused by auto emissions.
 - b.** use uranium to generate heat.
 - c.** make coal burn more cleanly.
 - d.** produce solar energy in photovoltaic cells.
- _____ **20.** What happens during nuclear fusion?
- a.** Fuel rods create nuclear energy.
 - b.** The nuclei of heavy atoms are split.
 - c.** Uranium-235 is processed into fuel pellets.
 - d.** The nuclei of hydrogen atoms combine.

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|--|--|
| _____ 1. nonconformity | a. sedimentary rock layers are younger than layers below |
| _____ 2. unconformity | b. determining absolute age by comparing radioactive and stable isotopes |
| _____ 3. varve | c. current geologic processes are the same as those that were at work in the past |
| _____ 4. law of crosscutting relationships | d. stratified rock resting on unstratified rock |
| _____ 5. radiometric dating | e. a fossilized mark formed by the movement of an animal |
| _____ 6. disconformity | f. a fossil used to determine the age of rock layers |
| _____ 7. trace fossil | g. a break in the geologic record |
| _____ 8. uniformitarianism | h. a banded layer of sand and silt deposited annually in a lake |
| _____ 9. law of superposition | i. a fault or body of rock is younger than any other body of rock it cuts through |
| _____ 10. index fossil | j. boundary between horizontal layers of sedimentary rock, and younger layers over an eroded surface |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Using rates of erosion to determine absolute age is only practical for geologic features
- between 100,000 and 200,000 years old.
 - between 10,000 and 20,000 years old.
 - about 2 million years old.
 - about 2 billion years old.
- _____ 12. Why is radioactive decay used to determine the actual age of rocks?
- Radioactive decay happens at a relatively constant rate.
 - Radioactive decay happens slowly.
 - Radioactive decay doesn't happen slowly.
 - Radioactive decay doesn't happen at a relatively constant rate.

Concept Review *continued*

- _____ **13.** The age of an object in relation to the ages of other objects is its
a. relative age.
b. absolute age.
c. cumulative age.
d. comparable age.
- _____ **14.** A break or crack in Earth's crust along which rocks shift their position is called a(n)
a. intrusion.
b. fault.
c. crosscut.
d. unconformity.
- _____ **15.** In general, sedimentary rock is deposited at the rate of
a. 30 cm over 1,000 years.
b. 30 cm over 100 years.
c. 30 m over 1,000 years.
d. 30 m over 1 million years.
- _____ **16.** A varve consists of a
a. fine summer layer of sediment overlaid with a coarse winter layer.
b. coarse summer layer of sediment over a fine winter layer.
c. coarse summer layer of sediment overlaid with a fine winter layer.
d. layer of coarse sediment deposited annually.
- _____ **17.** Almost all fossils are discovered in
a. igneous rock.
b. metamorphic rock.
c. sedimentary rock.
d. organic materials.
- _____ **18.** The study of fossils is called
a. archeology.
b. anthropology.
c. geology.
d. paleontology.
- _____ **19.** Paleontologists examine coprolites to
a. study replicas of the original organism.
b. study the surface features of the original organism.
c. help locate nearby dinosaur remains.
d. learn about the feeding habits of dinosaurs.
- _____ **20.** Geologists use index fossils to
a. study organisms that existed in very small numbers.
b. study organisms that lived during a long span of geologic time.
c. study similar types of fossils.
d. locate rock layers that contain oil and natural gas deposits.

Skills Worksheet

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|------------------------------|---|
| _____ 1. shield | a. a fossil that is used to date rocks |
| _____ 2. nebula | b. a unit of geologic time that is longer than an age but shorter than a period |
| _____ 3. evolution | c. an episode during which an enormous number of species dies |
| _____ 4. geologic column | d. a large area of exposed Precambrian rocks |
| _____ 5. epoch | e. a large cloud from which Earth formed |
| _____ 6. mass extinction | f. a theory that a meteorite caused the extinction of dinosaurs |
| _____ 7. index fossil | g. the gradual development of new organisms from preexisting organisms |
| _____ 8. period | h. an ordered arrangement of rock layers |
| _____ 9. geologic time scale | i. a unit of geologic time that is longer than an epoch but shorter than an era |
| _____ 10. impact hypothesis | j. a chart outlining the development Earth and life on Earth |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. “206 Ma” means
- “in the year 206.”
 - “206 years ago.”
 - “206 thousand years ago.”
 - “206 million years ago.”
- _____ 12. Coastlines took on their present shapes during the
- Miocene Epoch.
 - Pliocene Epoch.
 - Holocene Epoch.
 - Pleistocene Epoch.
- _____ 13. The most common Cambrian invertebrates were called
- brachiopods.
 - lungfish.
 - jellyfish.
 - trilobites.

Concept Review *continued*

- _____ **14.** Which of the following animal species evolved during the Paleocene Epoch?
- a.** Homo sapiens
 - b.** fish
 - c.** primates
 - d.** cockroaches
- _____ **15.** Dividing Precambrian time into smaller time units is difficult because
- a.** it was a very short period.
 - b.** Precambrian fossils show a wide variety of life-forms.
 - c.** Earth went through few changes during this time.
 - d.** few fossils exist in early Precambrian rocks.
- _____ **16.** Coal deposits in the eastern United States are the fossilized remains of forests and swamps from the
- a.** Permian Period.
 - b.** Carboniferous Period.
 - c.** Jurassic Period.
 - d.** Cretaceous Period.
- _____ **17.** A mass extinction of marine invertebrates occurred at the end of the Permian Period when
- a.** a large meteorite landed on Earth.
 - b.** shallow inland seas disappeared.
 - c.** tectonic plates collided.
 - d.** volcanic activity increased.
- _____ **18.** The climate during the Mesozoic Era was generally
- a.** icy.
 - b.** hot and dry.
 - c.** cool and dry.
 - d.** warm and humid.
- _____ **19.** The herbivore Apatosaurus belonged to the group of dinosaurs called
- a.** saurischians.
 - b.** ornithischians.
 - c.** pterosaurs.
 - d.** ichthyosaurs.
- _____ **20.** The division of geologic time that began with the last ice age and includes the present is called the
- a.** Cretaceous Period.
 - b.** Tertiary Period.
 - c.** Quaternary Period.
 - d.** Cenozoic Era.

Skills Worksheet

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|------------------------------|---|
| _____ 1. Pangaea | a. region along a plate boundary where one plate moves under another |
| _____ 2. lithosphere | b. piece of lithosphere with a unique geologic history |
| _____ 3. rift valley | c. crack in the center of a mid-ocean ridge |
| _____ 4. sea-floor spreading | d. supercontinent formed about 300 million years ago |
| _____ 5. paleomagnetism | e. residual magnetism of rock |
| _____ 6. terrane | f. process by which new sea floor forms |
| _____ 7. mid-ocean ridge | g. layer that forms the thin outer shell of Earth |
| _____ 8. subduction zone | h. cycle in which heated material rises and cooler material sinks |
| _____ 9. continental drift | i. undersea mountain range |
| _____ 10. convection cell | j. hypothesis that the continents once formed a single landmass |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. What kind of fossil evidence supported Wegener's hypothesis?
- a.** fossils hinting at a land bridge between South America and Africa
 - b.** fossils proving Mesosaurus never lived in Africa
 - c.** plant fossils showing that cold areas used to be tropical
 - d.** sea fossils proving the continents had plowed through the ocean floor
- _____ 12. Sea-floor spreading was a key discovery because it showed
- a.** that mid-ocean ridges exist.
 - b.** how continents move.
 - c.** why some rocks have reversed polarity.
 - d.** that mid-ocean ridges have rifts at the center.
- _____ 13. Tectonic plates ride on the layer of Earth's mantle called the
- a.** lithosphere.
 - b.** oceanic crust.
 - c.** continental crust.
 - d.** asthenosphere.

Concept Review *continued*

- _____ **14.** Scientists identify tectonic plate boundaries primarily by studying
- a.** the outlines of the continents.
 - b.** earthquake data.
 - c.** the Pacific Ring of Fire.
 - d.** active volcanoes.
- _____ **15.** A plate boundary at which two plates slide past each other horizontally is a
- a.** divergent boundary.
 - b.** convergent boundary.
 - c.** transform boundary.
 - d.** subduction zone.
- _____ **16.** Convection currents cause movement of tectonic plates by
- a.** making water in Earth's core boil.
 - b.** creating ridge push and slab pull.
 - c.** making hot mantle material sink.
 - d.** turning lithosphere to asthenosphere.
- _____ **17.** New, smaller continents may form from larger continents through
- a.** rifting.
 - b.** accretion.
 - c.** paleomagnetism.
 - d.** subduction.
- _____ **18.** What often forms when large terranes and continents collide?
- a.** mid-ocean ridges
 - b.** atolls
 - c.** seamounts
 - d.** major mountain chains
- _____ **19.** The movements of the continents
- a.** discourage the development of unique species.
 - b.** keep climates constant.
 - c.** create fewer mountain ranges.
 - d.** isolate some populations of organisms.
- _____ **20.** One likely result of the supercontinent cycle is that
- a.** the continents will continue to get further apart.
 - b.** California will move closer to the equator.
 - c.** the Mediterranean Sea will close.
 - d.** the Atlantic Ocean will disappear.

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|-------------------------------|--|
| _____ 1. shear stress | a. stress that stretches and pulls a body of rock apart |
| _____ 2. folded mountain | b. a series of mountains related in shape and structure |
| _____ 3. isostasy | c. a bend in rock layers from stress |
| _____ 4. fault-block mountain | d. distorts by pushing parts of the body in opposite directions |
| _____ 5. dome mountain | e. mountain formed when rock layers are squeezed and uplifted |
| _____ 6. fault | f. equilibrium in gravity and buoyancy between the asthenosphere and the lithosphere |
| _____ 7. compression | g. a break in rock where surrounding rock slides |
| _____ 8. tension | h. stress that squeezes and shortens rock |
| _____ 9. fold | i. forms where faults break Earth's crust into large blocks that tilt and drop |
| _____ 10. mountain range | j. mountain with rock layers sloping from a central point |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. What are four types of mountains?
- a. fretted, faulted, superdome, volcano
 - b. shear, vertical, horizontal, plateau
 - c. grabens, plateau, valley, peak
 - d. folded, fault-block, dome, volcanic
- _____ 12. How do folded mountains form?
- a. tectonic movements squeeze rock layers
 - b. tectonic movements make large blocks
 - c. tectonic plates pull apart
 - d. tectonic plates stretch and pull rock layers

Concept Review *continued*

- _____ **13.** What happens when continental and oceanic lithospheres collide?
- Deep ocean trenches are formed.
 - The oceanic lithosphere subducts beneath the continental lithosphere.
 - Large blocks of rock are broken loose.
 - The continental lithosphere subducts beneath the oceanic lithosphere.
- _____ **14.** What happens when two oceanic plates collide?
- The plates come to a standstill.
 - The lighter plate subducts beneath the other plate.
 - The denser plate subducts beneath the other plate.
 - They both subduct, forming a deep trench.
- _____ **15.** When two continents collide,
- an oceanic deformation will result.
 - both continents will be subducted.
 - one continent will be subducted.
 - the resulting uplift can form mountains.
- _____ **16.** Where do volcanic mountains commonly form?
- along convergent plate boundaries
 - away from plate boundaries
 - along divergent plate boundaries
 - at high elevations
- _____ **17.** What is deformation?
- folding of the asthenosphere
 - bending, tilting, and breaking of Earth's crust
 - collision and divergence
 - equilibrium in the crust
- _____ **18.** What is strain?
- stretching of rock
 - any change in rock from stress
 - the same as stress
 - rock being pulled apart
- _____ **19.** Plateaus are
- folded mountains.
 - large, flat areas of rock below sea level.
 - large, flat areas of rock high above sea level.
 - flat mountains.
- _____ **20.** The sloping sides of a fold are called
- layers.
 - legs.
 - hinges.
 - limbs.

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|----------------------------------|---|
| _____ 1. seismic gap | a. an instrument used for detecting and recording vibrations in the ground |
| _____ 2. Richter scale | b. a measurement of earthquake strength based on the size of the area of the fault that moves |
| _____ 3. body wave | c. a scale expressing earthquake intensity |
| _____ 4. tsunami | d. a wave that travels through the body of a medium |
| _____ 5. modified Mercalli scale | e. a scale that measures the ground motion from earthquakes |
| _____ 6. surface wave | f. the sudden return of deformed rock to its undeformed state |
| _____ 7. seismograph | g. a wave that travels along the surface of a body, not through the middle |
| _____ 8. foreshock | h. a fault area where few quakes have occurred recently, but where strong quakes have occurred in the past |
| _____ 9. elastic rebound | i. a little earthquake that precedes a larger one |
| _____ 10. moment magnitude | j. a giant wave that can form after an undersea earthquake |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. What can happen to tall buildings during an earthquake?
- a.** They can crack and implode.
 - b.** The windows can blow out from the inside.
 - c.** Nothing usually happens.
 - d.** They can sway and even tip over.
- _____ 12. If you are inside during an earthquake,
- a.** lie down in an open area.
 - b.** call 911.
 - c.** get outside as quickly as possible.
 - d.** stand in a doorway or crouch under a desk.

Concept Review *continued*

- _____ **13.** Why do seismic waves speed up at about 30 km beneath the surface of continents?
- a.** because Earth's mantle is denser than the crust
 - b.** because of Earth's magnetic field
 - c.** because Earth's crust is denser than the mantle
 - d.** because of the force of gravity
- _____ **14.** Why do earthquakes usually occur at plate boundaries?
- a.** because stress on the rocks is least at the boundaries
 - b.** because of gravity pushing down on the plates
 - c.** because the stress on the rocks of the plates is greatest at the boundaries
 - d.** because of the magnetic qualities of the plates
- _____ **15.** If you are in a car during an earthquake, you should
- a.** stop away from structures that might collapse.
 - b.** get inside a building.
 - c.** get out of the car.
 - d.** drive away quickly.
- _____ **16.** When an earthquake occurs,
- a.** run as fast as you can.
 - b.** stay calm.
 - c.** get inside a building.
 - d.** panic.
- _____ **17.** How do scientists find the distance to an epicenter?
- a.** by analyzing departure times of P waves and S waves
 - b.** by graphing P waves and Q waves
 - c.** by measuring distances in kilometers
 - d.** by analyzing arrival times of P waves and S waves
- _____ **18.** Scientists monitor natural gas seepage from rocks because
- a.** it may cause earthquakes.
 - b.** it may mean trouble.
 - c.** it may indicate seismic activity.
 - d.** it may indicate the presence of oil.
- _____ **19.** Where does the first motion of an earthquake occur?
- a.** at the focus
 - b.** at the center
 - c.** in the fault zone
 - d.** in the crust
- _____ **20.** What is another name for a P wave?
- a.** a proper wave
 - b.** a secondary wave
 - c.** a tidal wave
 - d.** a primary wave

Skills Worksheet

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|-------------------------------|--|
| _____ 1. magma | a. magma that flows onto Earth's surface; the rock that forms when lava cools and solidifies |
| _____ 2. volcanism | b. describes magma or igneous rock that is rich in feldspar and silica and that is generally light in color |
| _____ 3. lava | c. liquid rock produced under Earth's surface |
| _____ 4. volcano | d. describes magma or igneous rock that is rich in magnesium and iron and that is generally dark in color |
| _____ 5. hot spot | e. a vent or fissure in Earth's surface through which magma and gases are expelled |
| _____ 6. mafic | f. a volcanically active area of Earth's surface, commonly far from a tectonic plate boundary |
| _____ 7. felsic | g. any activity that includes the movement of magma toward or onto Earth's surface |
| _____ 8. pyroclastic material | h. a large, circular depression that forms when the magma chamber below a volcano partially empties and causes the ground above to sink |
| _____ 9. caldera | i. a type of volcano that has very steep slopes |
| _____ 10. cinder cone | j. fragments of rock that form during a volcanic eruption |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Magma can change form when
- the outside temperature changes.
 - the tectonic plates shift.
 - water is added to hot rock.
 - an earthquake occurs.
- _____ 12. Volcanism is common at convergent and divergent boundaries of
- | | |
|----------------------------|-------------------|
| a. tectonic plates. | c. oceans. |
| b. continents. | d. vents. |
- _____ 13. Hot spots are areas of volcanic activity located over rising
- | | |
|------------------|--------------------------|
| a. gases. | c. calderas. |
| b. lava. | d. mantle plumes. |

Concept Review *continued*

- _____ **14.** This type of mafic lava flow forms a wrinkly, rope-like texture when it cools.
- a.** blocky lava
 - b.** aa
 - c.** pluton
 - d.** pahoehoe
- _____ **15.** Volcanoes take place in zones near convergent and divergent boundaries of tectonic plates, in subduction zones, and in
- a.** cinder cones.
 - b.** mountainous areas.
 - c.** mid-ocean ridges.
 - d.** flood zones.
- _____ **16.** When magma cools and solidifies inside the crust, it causes large formations of igneous rock called
- a.** plutons.
 - b.** plumes.
 - c.** intrusives.
 - d.** fractures.
- _____ **17.** Thick, sticky magma, high in viscosity and trapped gases, causes
- a.** quiet eruptions.
 - b.** explosive eruptions.
 - c.** no eruptions.
 - d.** most eruptions.
- _____ **18.** The largest type of pyroclastic material is
- a.** volcanic dust.
 - b.** volcanic blocks.
 - c.** lapilli.
 - d.** volcanic bombs.
- _____ **19.** Which of the following is NOT a type of volcano?
- a.** shield
 - b.** composite
 - c.** crater
 - d.** cinder cone
- _____ **20.** Which of the following does NOT signal a volcanic eruption?
- a.** change in earthquake activity
 - b.** change in volcano shape
 - c.** change in composition and amount of gases emitted
 - d.** changes in ocean temperature

Skills Worksheet

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|----------------------------------|--|
| _____ 1. horizon | a. the process by which rocks break down as a result of chemical reactions |
| _____ 2. erosion | b. a process in which the materials of Earth's surface are loosened, dissolved, or worn away and transported from one place to another by a natural agent, such as wind, water, ice, or gravity |
| _____ 3. oxidation | c. a vertical section of soil that shows the layers of horizons |
| _____ 4. abrasion | d. a reaction that removes one or more electrons from a substance such that the substance's valence or oxidation state increases |
| _____ 5. mechanical weathering | e. the process by which softer, less weather resistant rocks wear away at a faster rate than harder, more weather resistant rocks do |
| _____ 6. soil profile | f. the elevation or slope of land; affects the rate of weathering |
| _____ 7. chemical weathering | g. the process by which rocks break down into smaller pieces by physical means |
| _____ 8. differential weathering | h. the grinding and wearing away of rock surfaces through the mechanical action of other rock or sand particles |
| _____ 9. topography | i. the slow, downslope flow of soil saturated with water in areas surrounding glaciers at high elevations |
| _____ 10. solifluction | j. a horizontal layer of soil that can be distinguished from the layers above and below it; also a boundary between two rock layers that have different physical properties |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- | | |
|---|--|
| _____ 11. Which landforms are NOT typical in hot, dry climates? | _____ 12. Which of the following does NOT involve a chemical process that decomposes rock? |
| a. buttes | a. carbonation |
| b. round hills | b. hydrolysis |
| c. mesas | c. ice wedging |
| d. plateaus | d. acid precipitation |

Concept Review *continued*

- _____ **13.** The layer of rock fragments that covers much of Earth's surface is called
- a.** bedrock.
 - b.** regolith.
 - c.** humus.
 - d.** pedifer.
- _____ **14.** Climates that have the fastest rates of weathering
- a.** are hot and dry.
 - b.** are warm and humid.
 - c.** alternate between hot and cold.
 - d.** are cold and dry.
- _____ **15.** Which of the following is NOT a farming method that conserves soil?
- a.** terracing
 - b.** strip-cropping
 - c.** crop dusting
 - d.** contour plowing
- _____ **16.** The rock from which soil was weathered, and upon which the characteristics of soil mainly depend on, is called
- a.** igneous.
 - b.** bedrock.
 - c.** limestone.
 - d.** parent rock.
- _____ **17.** When a rock's exposure to weathering agents increases,
- a.** the rock weathers faster.
 - b.** the rock weathers more slowly.
 - c.** the rock stops weathering.
 - d.** the rock produces nitric acid.
- _____ **18.** The various layers of soil—topsoil, subsoil, and bedrock—can be viewed and studied in
- a.** humus.
 - b.** transported soil.
 - c.** residual soil
 - d.** a soil profile.
- _____ **19.** Soil characteristic of desert and arctic regions is
- a.** thick and fertile.
 - b.** thin and fertile.
 - c.** thick and nutrient-poor.
 - d.** thin and nutrient-poor.
- _____ **20.** In which of these events is gravity a factor in erosion?
- a.** abrasion
 - b.** sheet erosion
 - c.** dust storm
 - d.** slump

Skills Worksheet

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|-----------------------------|--|
| _____ 1. condensation | a. any form of water that falls to Earth's surface from the clouds, including rain, snow, sleet, and hail |
| _____ 2. floodplain | b. change of state from a gas to a liquid |
| _____ 3. watershed | c. the process of removing salt from ocean water |
| _____ 4. tributary | d. area along a river, formed by sediments deposited when the river overflows its banks |
| _____ 5. evapotranspiration | e. fan-shaped mass of rock material deposited by a stream on land where the slope decreases sharply |
| _____ 6. discharge | f. area of land drained by a river system |
| _____ 7. desalination | g. fan-shaped mass of rock material deposited at the mouth of a stream into another body of water |
| _____ 8. delta | h. volume of water moved by a stream in a given time period |
| _____ 9. precipitation | i. the total water loss from an area by evaporation and transpiration |
| _____ 10. alluvial fan | j. stream that flows into a lake or into a larger stream |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. A river system begins to form in a given area when
- a.** evapotranspiration exceeds precipitation.
 - b.** precipitation exceeds evapotranspiration.
 - c.** precipitation exceeds condensation.
 - d.** condensation exceeds precipitation.
- _____ 12. What happens over time as a stream's channel erodes?
- a.** The stream becomes a watershed.
 - b.** The stream becomes a valley.
 - c.** The stream becomes a river
 - d.** The stream dries out.

Concept Review *continued*

- _____ **13.** When precipitation exceeds evapotranspiration and runoff,
a. soil becomes dry and irrigation is necessary.
b. soil becomes moist and wind increases.
c. soil becomes dry and flooding is possible.
d. soil becomes moist and flooding is possible.
- _____ **14.** Which of the following factors affect the water budget?
a. temperature, vegetation, wind, rainfall
b. rock formation, conservation, rainfall, supply costs
c. purification costs, water management, conservation, rainfall
d. desalination, conservation, cost of land, rainfall
- _____ **15.** Which of the following are stages of the water cycle?
a. transportation, deposition, precipitation
b. evapotranspiration, condensation, precipitation
c. evaporation, transmutation, participation
d. transubstantiation, condensation, precession
- _____ **16.** Why do people choose to live in floodplains?
a. There is access to fishing and the soil is rich.
b. Floods can be overcome.
c. Water drainage is good.
d. The soil is good for housing development.
- _____ **17.** Which of the following are methods of water conservation?
a. encouraging pollution
b. damming rivers
c. reducing evaporation and condensation
d. enforcing conservation laws
- _____ **18.** Which of the following affect erosion caused by a river?
a. acid rain and pollution
b. rocks and sand
c. discharge and gradient
d. watersheds and floods
- _____ **19.** Which is a direct method of flood control?
a. soil conservation
b. dam
c. natural levee
d. valley
- _____ **20.** A lake forms when
a. two or more rivers meet.
b. a river runs dry.
c. condensation occurs.
d. precipitation collects in a depression.

Skills Worksheet

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|-----------------------------|---|
| _____ 1. artesian formation | a. water with high concentrations of dissolved minerals |
| _____ 2. groundwater | b. a large cave consisting of many smaller connecting chambers |
| _____ 3. permeability | c. a circular depression that forms at the surface when rock dissolves, sediment is removed, or caves collapse |
| _____ 4. porosity | d. a system of caverns, sinkholes, and underground drainage |
| _____ 5. aquifer | e. water beneath Earth's surface |
| _____ 6. water table | f. a body of rock that stores and allows the flow of underground water |
| _____ 7. karst topography | g. the percentage of the total volume of rock consisting of open spaces |
| _____ 8. cavern | h. the ability of rock to let water flow through its open spaces |
| _____ 9. sinkhole | i. the upper surface of underground water |
| _____ 10. hard water | j. the sloping layer of permeable rock between two layers of impermeable rock that is exposed at the surface |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- | | |
|--|---|
| _____ 11. Rock or sediment with low porosity is characterized by | _____ 12. Groundwater flows downward in response to |
| a. poorly sorted particles of different sizes. | a. porosity. |
| b. well-sorted, fine-grained particles. | b. gravity. |
| c. well-sorted, coarse-grained particles. | c. topography. |
| d. loosely packed particles. | d. capillary pull. |
| | _____ 13. The zone of aeration is composed of how many regions? |
| | a. one |
| | b. two |
| | c. three |
| | d. four |

Concept Review *continued*

- _____ **14.** Weak acid formed by the passage of water through soil causes
- a.** capillary action.
 - b.** aeration.
 - c.** chemical weathering.
 - d.** saturation.
- _____ **15.** Two land features formed by hot groundwater are hot springs and
- a.** sinkholes.
 - b.** stalactites.
 - c.** stalagmites.
 - d.** geysers.
- _____ **16.** Two of the most important properties of aquifers that affect the flow of groundwater are porosity and
- a.** permeability.
 - b.** sorting.
 - c.** sediment.
 - d.** packing.
- _____ **17.** How does the water table relate to surface topography?
- a.** The water table usually mirrors surface topography.
 - b.** The water table is not affected by surface topography.
 - c.** The water table is similar to surface topography in dry regions.
 - d.** The water table takes shape according to the porosity of the rock.
- _____ **18.** A hole dug below the water level in order to bring water to the surface is called a(n)
- a.** spring.
 - b.** artesian feature.
 - c.** depression.
 - d.** well.
- _____ **19.** What is a natural flow of water to the surface where the surface dips below the water table?
- a.** cone
 - b.** spring
 - c.** geyser
 - d.** well
- _____ **20.** A sloping layer of permeable rock captured between two layers of impermeable rock is called a(n)
- a.** artesian formation.
 - b.** caprock.
 - c.** spring.
 - d.** geyser.

Skills Worksheet

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|--------------------------------|--|
| _____ 1. snowfield | a. a narrow glacier formed in a mountainous region |
| _____ 2. ice shelf | b. part of an ice sheet that moves over the ocean |
| _____ 3. cirque | c. a wobble in Earth's axis |
| _____ 4. esker | d. a large rock transported by a glacier from a distant source |
| _____ 5. glacier | e. the process by which glaciers flow as ice grains deform under pressure and slide over each other |
| _____ 6. internal plastic flow | f. a bowl-shaped depression formed by glacial erosion |
| _____ 7. erratic | g. a long, winding ridge of stratified drift |
| _____ 8. interglacial period | h. a large mass of moving ice |
| _____ 9. precession | i. an almost motionless mass of permanent snow and ice |
| _____ 10. alpine glacier | j. a period of warmer climate during which glaciers retreat |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- | | |
|---|---|
| _____ 11. Which of the following features form when tension and compression build under the surface of a flowing glacier? | _____ 13. Which of the following features is caused by erosion rather than by deposition? |
| a. crevasses | a. drumlin |
| b. ice shelves | b. kettle |
| c. kettles | c. esker |
| d. roches moutonnées | d. horn |
| _____ 12. Ice in a glacier moves downslope in response to | _____ 14. A moraine is an example of a(n) |
| a. friction. | a. sorted glacial deposit. |
| b. melting. | b. unsorted glacial deposit. |
| c. gravity. | c. erosional feature caused by moving ice. |
| d. freezing. | d. erosional feature caused by moving water. |

Concept Review *continued*

- _____ **15.** Which of the following are needed to form a salt lake?
- a.** periods of low temperatures
 - b.** high precipitation rates
 - c.** multiple outlet streams
 - d.** rapid evaporation rates
- _____ **16.** Where has evidence of past glaciation been found?
- a.** in outwash plains
 - b.** in glacial crevasses
 - c.** on mountaintops
 - d.** in shells of dead marine animals
- _____ **17.** What is till?
- a.** sorted deposits of rock material
 - b.** unsorted glacial drift
 - c.** sorted deposits of sand
 - d.** sediment sorted by melted ice
- _____ **18.** Which of the following probably occurs before an ice age begins?
- a.** longer interglacial periods
 - b.** a rise in sea level
 - c.** a slow drop in global temperatures
 - d.** a decrease in precipitation
- _____ **19.** Which of the following does the Milankovitch theory consider to be factors in the cause of glacial periods?
- a.** changes in the amount of radiation produced by the sun
 - b.** blockage of the sun's rays by volcanic dust
 - c.** movement of continents, which affects warm ocean currents
 - d.** small changes in Earth's orbit, tilt, and precession
- _____ **20.** Which of the following occurs when a glacier moves by basal slip?
- a.** A glacier's weight melts ice where it touches the ground.
 - b.** Meltwater flows beneath a glacier.
 - c.** Deformed grains of ice slide over each other.
 - d.** Warmer temperatures at the glacier's surface melt ice.

Skills Worksheet

Concept Review

In the space provided, write the letter of the description that best matches each term or phrase.

- | | |
|--------------------------|--|
| _____ 1. lagoon | a. fine-grained sediment formed by the accumulation of windblown dust |
| _____ 2. deflation | b. deep bay with steep walls |
| _____ 3. beach | c. sand ridge that forms at a right angle to wind direction |
| _____ 4. estuary | d. region of shallow water between a barrier island and the shoreline |
| _____ 5. loess | e. form of erosion in which fine, dry soil particles are blown away |
| _____ 6. headland | f. resistant rock formation that projects out from shore |
| _____ 7. ventifact | g. process by which wind moves sand along the ground |
| _____ 8. fiord | h. area of shoreline made up of deposited sediment |
| _____ 9. transverse dune | i. bay in which salt water and fresh water mix |
| _____ 10. saltation | j. rock smoothed by wind erosion |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- | | |
|---|--|
| _____ 11. The feature formed when sea level rises or land sinks is called a(n)
a. emergent coastline.
b. fiord.
c. submergent coastline.
d. lagoon. | _____ 13. Which of the following is the result of wave erosion?
a. sea cliff
b. berm
c. barchan dune
d. beach |
| _____ 12. Rock particles that remain after deflation occurs often form
a. deflation hollows.
b. ventifacts.
c. barchan dunes.
d. desert pavement, or stone pavement. | _____ 14. During dune migration, sand moves over the dune crest and builds up on the
a. fiord.
b. headland.
c. slipface.
d. berm. |

Concept Review *continued*

- _____ **15.** The abrasive action of waves that reduces rocks to small pebbles and sand grains is called
- a.** chemical weathering.
 - b.** deflation.
 - c.** saltation.
 - d.** mechanical weathering.
- _____ **16.** When an emergent coastline forms and it has a gentle slope, the coastline will feature
- a.** long, wide beaches.
 - b.** bays or headlands.
 - c.** sea cliffs.
 - d.** narrow inlets.
- _____ **17.** Which of the following causes a change in absolute sea level?
- a.** movement of Earth's crust
 - b.** movement of tectonic plates
 - c.** change in the amount of ocean water
 - d.** change in pollution level
- _____ **18.** A longshore current produces sand deposits called
- a.** beaches and berms.
 - b.** spits and tombolos.
 - c.** sea caves and arches.
 - d.** estuaries and fiords.
- _____ **19.** Coastal lands can be preserved by
- a.** eroding barrier islands.
 - b.** slowing development.
 - c.** draining lagoons.
 - d.** increasing pollution risk.
- _____ **20.** A sea cave forms when
- a.** waves erode the base of a sea cliff.
 - b.** sand moves along the shore.
 - c.** Earth's crust moves.
 - d.** a wave-cut terrace collapses.

Skills Worksheet

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|----------------------------|---|
| _____ 1. abyssal plain | a. flat-topped, submerged seamount |
| _____ 2. continental shelf | b. underwater mountain range |
| _____ 3. mid-ocean ridge | c. rough topography across an underwater ridge |
| _____ 4. continental slope | d. the part of the continent covered by water |
| _____ 5. guyot | e. flat area of deep-ocean basin |
| _____ 6. continental rise | f. deep, v-shaped underwater valley |
| _____ 7. submarine canyon | g. steep slope from the continental shelf to the ocean |
| _____ 8. seamount | h. submerged volcanic mountain taller than 1 km |
| _____ 9. trench | i. raised wedge at the base of a continental slope |
| _____ 10. fracture zone | j. long, narrow depression in deep-ocean basin |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Some inorganic sediments in the ocean basin come from
- a.** radiolarians.
 - b.** nodules.
 - c.** icebergs.
 - d.** foraminiferans.
- _____ 12. The deepest of Earth's major oceans is the
- a.** Atlantic.
 - b.** Pacific.
 - c.** Indian.
 - d.** Southern.
- _____ 13. Sediments are spread over wide areas of the deep-ocean basins by
- a.** nodules.
 - b.** core samples.
 - c.** turbidity currents.
 - d.** wave erosion.

Concept Review *continued*

- _____ **14.** Deep-ocean floor sediment that is formed from the shells of radiolarians and diatoms is
- mud.
 - calcareous ooze.
 - siliceous ooze.
 - foraminiferans.
- _____ **15.** Oceanographers can use sonar to calculate the depth of the ocean floor because
- sound waves can penetrate the ocean floor.
 - echoes do not travel through sea water.
 - sound waves travel about 1,500 m/s through sea water.
 - sound waves bounce off the ocean floor.
- _____ **16.** A research vessel that goes deep in the ocean but remains connected to the research ship is a
- submarine robot.
 - drilling ship.
 - bathyscaph.
 - bathysphere.
- _____ **17.** An example of a sea is the
- Indian.
 - Caribbean.
 - Arctic.
 - Southern.
- _____ **18.** Which is caused by glacial periods?
- The continental shelf erodes.
 - Submarine canyons form in the continental shelf.
 - Water covers the continental shelf.
 - The continental shelf grows smaller.
- _____ **19.** Which is NOT a source of deep-ocean basin sediment?
- icebergs
 - volcanoes
 - meteorites
 - earthquakes
- _____ **20.** A deep-ocean floor sediment that consists of at least 40% clay particles is a form of
- calcareous ooze.
 - mud.
 - nodule.
 - siliceous ooze.

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|---|--|
| _____ 1. nitrogen, oxygen, and carbon dioxide | a. the ratio of the mass of a substance to the volume of the substance; commonly expressed as grams per cubic centimeter for solids and as grams per liter for gases |
| _____ 2. salinity | b. the foundation of life in the ocean |
| _____ 3. pack ice | c. this measurement is affected by the amount of solar energy an area receives and by the movement of water |
| _____ 4. ocean temperature | d. by studying variations in this, scientists can determine the presence of phytoplankton in the ocean |
| _____ 5. thermocline | e. atmospheric gases that are also the main gases found in ocean water |
| _____ 6. density | f. a layer in a body of water in which water temperature drops with increased depth faster than it does in other areas |
| _____ 7. ocean color | g. important resources of the ocean |
| _____ 8. plankton | h. major pollutants in the ocean |
| _____ 9. food, minerals, fresh water | i. a measure of the amount of dissolved salts in a given amount of liquid |
| _____ 10. mercury, insecticide, and DDT | j. a floating layer of sea ice that completely covers an area of the ocean surface |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Marine organisms help maintain the chemical balance of ocean water by removing nutrients and gases from the ocean and
- returning other nutrients and gases to the water.
 - producing bacteria that destroy pollutants.
 - adding no new elements to the water.
 - introducing minerals and trace elements to the water.
- _____ 12. Plankton can be called “the foundation of life in the ocean” because they
- are marine organisms that need sunlight.
 - live in the upper 100 m of water.
 - form the base of complex food webs in the ocean.
 - are one of three main food sources in the ocean.

Concept Review *continued*

- _____ **13.** This type of ocean water dissolves gases most easily.
- a.** cold
 - b.** warm
 - c.** shallow
 - d.** salty
- _____ **14.** Why is the ocean called a carbon sink?
- a.** Ocean water destroys trace carbon elements.
 - b.** Organisms in the water release carbon dioxide into the air.
 - c.** Ocean water dissolves carbon dioxide from the atmosphere.
 - d.** Ocean water becomes more salty with high carbon levels.
- _____ **15.** In the benthic zone of the ocean, you might find
- a.** dolphins.
 - b.** whales.
 - c.** swordfish.
 - d.** starfish.
- _____ **16.** In the pelagic zone of the ocean, you might find
- a.** sponges.
 - b.** tuna.
 - c.** worms.
 - d.** octopuses.
- _____ **17.** Which of the following items is NOT a means of obtaining fresh water from the ocean?
- a.** aquaculture
 - b.** desalination
 - c.** freezing
 - d.** reverse osmosis desalination
- _____ **18.** Which of the following sea life is an example of nekton?
- a.** oysters
 - b.** cod
 - c.** plankton
 - d.** sea stars
- _____ **19.** Which of the following sea life is an example of benthos?
- a.** plankton
 - b.** dolphins
 - c.** squid
 - d.** crabs
- _____ **20.** The most valuable resource found in the ocean is
- a.** salt.
 - b.** petroleum.
 - c.** fish.
 - d.** trace elements.

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|----------------------------|--|
| _____ 1. gyre | a. swift, warm Atlantic current that flows along the eastern United States |
| _____ 2. tidal current | b. movement of water toward and away from the coast caused by rising and falling tides |
| _____ 3. Gulf Stream | c. streamlike movement of ocean water far below the surface |
| _____ 4. deep current | d. time required for two consecutive wave crests to pass a given point |
| _____ 5. wave | e. huge circle of moving ocean water found above and below the equator |
| _____ 6. refraction | f. curving of the path of oceans and winds due to Earth's rotation |
| _____ 7. tidal oscillation | g. horizontal movement of ocean water at or near the ocean's surface that is caused by winds |
| _____ 8. Coriolis effect | h. process by which ocean waves bend toward the coastline as they approach shallow water |
| _____ 9. wave period | i. slow, rocking motion of ocean water that occurs as tidal bulges move around the ocean basins |
| _____ 10. surface current | j. periodic disturbance in a solid, liquid, or gas as energy is transmitted through a medium |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. A force that pushes currents westward across the tropical latitudes of all three major oceans is called
- a.** gravity.
 - b.** Gulf Stream.
 - c.** trade winds.
 - d.** westerlies.
- _____ 12. The deep current that moves slowly northward along the ocean bottom to a latitude of about 40°N is the
- a.** Sargasso Sea.
 - b.** Antarctic Circumpolar Current.
 - c.** Antarctic Bottom Water.
 - d.** North Atlantic Current.

Concept Review *continued*

- _____ **13.** A breaker forms when
- the bottom of a wave is slowed and the top of the wave continues moving at its original speed.
 - energy is transferred from the air to the ocean.
 - the path of oceans and winds curves.
 - cooling water contracts.
- _____ **14.** Most tsunamis are caused by
- wind.
 - earthquakes on the ocean floor.
 - the gravitational force of the moon.
 - turbidity currents.
- _____ **15.** How do you calculate the speed of a wave?
- Divide the wave period by its wavelength.
 - Divide the wavelength by the wave period.
 - Multiply the wave height by the wavelength.
 - Divide the wavelength by the wave height.
- _____ **16.** The movement of the tidal current when it flows toward the ocean is called
- slack water.
 - flood tide.
 - ebb tide.
 - tidal bore.
- _____ **17.** The gravitational pull of the moon on Earth and Earth's waters causes
- gyres.
 - monsoons.
 - the Coriolis effect.
 - tides.
- _____ **18.** What happens to the diameter of a water molecule's circular motion in a wave?
- It increases as water depth decreases.
 - It decreases as water depth increases.
 - It increases, decreases, and then increases again as depth decreases.
 - It does not change as water depth changes.
- _____ **19.** Which of the following tides occur during both the new moon and the full moon?
- spring tides
 - neap tides
 - tidal waves
 - flood tides
- _____ **20.** Which of the following describes the type of tides that occur each day along the U.S. Atlantic Coast?
- one high tide and one low tide
 - one very high tide followed by two lower high tides
 - two high tides and two low tides
 - one high tide and two low tides

Skills Worksheet

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|-----------------------------------|--|
| _____ 1. layers of the atmosphere | a. all forms of energy that travel through space as waves |
| _____ 2. radiation | b. prevailing winds that blow from west to east between 30° and 60° latitude in both hemispheres |
| _____ 3. conduction | c. the curving of the path of a moving object from an otherwise straight path due to Earth's rotation |
| _____ 4. convection | d. troposphere; stratosphere; mesosphere; thermosphere |
| _____ 5. Coriolis effect | e. polar easterlies meet warm air from the westerlies, creating a stormy area |
| _____ 6. global winds | f. the transfer of energy as heat through a material |
| _____ 7. trade winds | g. prevailing winds that blow from east to west between 60° and 90° latitude in both hemispheres |
| _____ 8. westerlies | h. prevailing winds that blow from 30° to 0° latitude in both hemispheres |
| _____ 9. polar easterlies | i. looping patterns of air flow, called convection cells, that move from the poles to the equator |
| _____ 10. front | j. the movement of matter due to differences in density that are caused by temperature variations; can result in the transfer of energy as heat |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. The atmosphere is a mixture of gases that surround Earth. Which of the following is NOT a gaseous component of the atmosphere?
- | | |
|--------------------------|------------------------|
| a. carbon dioxide | c. particulates |
| b. argon | d. nitrogen |
- _____ 12. Atmospheric pressure presses on the liquid mercury in a well of this instrument. The mercury rises in a tube as the atmospheric pressure rises. What is this instrument?
- | | |
|-------------------------------|-----------------------------|
| a. mercurial barometer | c. aneroid barometer |
| b. altimeter | d. thermometer |

Concept Review *continued*

- _____ **13.** Changes in atmospheric pressure cause the sides of this instrument to bend inward or outward. Changes are measured on a scale. What is this instrument?
- a.** mercurial barometer
 - b.** altimeter
 - c.** aneroid barometer
 - d.** thermometer
- _____ **14.** All radiant energy reaches earth as a form of
- a.** light waves.
 - b.** sound waves.
 - c.** electromagnetic waves.
 - d.** ultraviolet waves.
- _____ **15.** Solar energy warms Earth when radiation is
- a.** reflected.
 - b.** refracted.
 - c.** scattered.
 - d.** absorbed.
- _____ **16.** Which of the following affects local wind patterns?
- a.** trade winds
 - b.** local temperature variations
 - c.** solar storms
 - d.** season changes
- _____ **17.** The gas that makes up most of Earth's atmosphere is
- a.** oxygen.
 - b.** argon.
 - c.** nitrogen.
 - d.** ozone.
- _____ **18.** All of the following are particulates EXCEPT
- a.** carbon dioxide.
 - b.** salt particles.
 - c.** volcanic ash.
 - d.** pollen.
- _____ **19.** The atmospheric layer that is closest to Earth and is where all weather conditions exist is the
- a.** troposphere.
 - b.** mesosphere.
 - c.** stratosphere.
 - d.** thermosphere.
- _____ **20.** The main source of air pollution is
- a.** the nitrogen cycle.
 - b.** temperature inversions.
 - c.** smog.
 - d.** the burning of fossil fuels.

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|-------------------------------|--|
| _____ 1. sublimation | a. a suspended particle that provides a surface for condensation |
| _____ 2. precipitation | b. formation of a large droplet by the combination of small droplets |
| _____ 3. cloud | c. the temperature at which condensation equals evaporation |
| _____ 4. dew point | d. collection of water droplets or ice crystals suspended in the air |
| _____ 5. fog | e. heat energy that is absorbed or released during a phase change |
| _____ 6. condensation nucleus | f. the mass of water vapor contained in a given volume of air |
| _____ 7. latent heat | g. the process by which a solid changes directly into a gas |
| _____ 8. absolute humidity | h. a mass of water vapor that condenses near the surface of Earth |
| _____ 9. relative humidity | i. any form of water that falls to Earth's surface from clouds |
| _____ 10. coalescence | j. the ratio of actual water vapor content of the air to the amount of water vapor needed to reach saturation |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. What is a low-altitude billowy cloud called?
- a.** a stratus cloud
 - b.** a cumulus cloud
 - c.** a cirrus cloud
 - d.** fog
- _____ 12. Water vapor changes into a liquid in the process of
- a.** evaporation.
 - b.** supercooling.
 - c.** condensation.
 - d.** latent heat.

Concept Review *continued*

- _____ **13.** Precipitation formed in cumulonimbus clouds when convection currents repeatedly carry raindrops to high levels is
- a.** rain.
 - b.** sleet.
 - c.** snow.
 - d.** hail.
- _____ **14.** The process in which the temperature of an air mass decreases as the air rises and expands is called
- a.** adiabatic cooling.
 - b.** mixing.
 - c.** lifting.
 - d.** advective cooling.
- _____ **15.** Fog that results from the nightly cooling of Earth is called
- a.** advection fog.
 - b.** upslope fog.
 - c.** radiation fog.
 - d.** steam fog.
- _____ **16.** The purpose of cloud seeding is to
- a.** predict storms.
 - b.** induce precipitation.
 - c.** prevent storms.
 - d.** prevent condensation.
- _____ **17.** A condition in which water is cooled below its freezing point without going through a change of state is called
- a.** sublimation.
 - b.** condensation.
 - c.** evaporation.
 - d.** supercooling.
- _____ **18.** In order to find out how intense precipitation will be, meteorologists use
- a.** a rain gauge.
 - b.** Doppler radar.
 - c.** cloud seeding.
 - d.** a psychrometer.
- _____ **19.** Large cloud formations associated with storm systems form by
- a.** adiabatic cooling.
 - b.** mixing.
 - c.** lifting.
 - d.** advective cooling.
- _____ **20.** What forms when the dew point falls below the freezing temperature of water and water vapor turns directly to ice?
- a.** dew
 - b.** frost
 - c.** frozen dew
 - d.** sleet

Skills Worksheet

Concept Review**MATCHING**

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|------------------------------|---|
| _____ 1. hurricane | a. the front edge of a moving mass of cold air that pushes beneath a warmer air mass like a wedge |
| _____ 2. cold front | b. a usually brief, heavy storm that consists of rain, strong winds, lightning, and thunder |
| _____ 3. station model | c. a system that uses reflected radio waves to determine the velocity and location of objects |
| _____ 4. midlatitude cyclone | d. an instrument used to determine direction of the wind |
| _____ 5. barometer | e. a severe storm that develops over tropical oceans and whose strong winds of more than 120 km/h spiral in toward the intensely low-pressure storm center |
| _____ 6. air mass | f. a large body of air throughout which temperature and moisture content are similar |
| _____ 7. thunderstorm | g. an area of low pressure that is characterized by rotating wind that moves toward the rising air of the central low-pressure region |
| _____ 8. wind vane | h. an instrument that measures atmospheric pressure |
| _____ 9. radar | i. a pattern of meteorological symbols that represents the weather at a particular observing station and that is recorded on a weather map |
| _____ 10. stationary front | j. a front of air masses that moves either very slowly or not at all |

MULTIPLE CHOICE

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Weather observers and automated systems send data to
- | | |
|-------------------------------|-------------------------------|
| a. the WMO. | c. the United States. |
| b. collection centers. | d. the United Nations. |
- _____ 12. Continental polar, maritime polar, continental tropical, and maritime tropical are all examples of
- | | |
|-----------------------|------------------------------|
| a. oceans. | c. weather fronts. |
| b. air masses. | d. temperature zones. |

Concept Review *continued*

- _____ **13.** Meteorologists use symbols and colors to create
- a.** weather models.
 - b.** topographical maps.
 - c.** weather maps
 - d.** weather images.
- _____ **14.** Continental air masses that affect the weather of North America come from Canada and
- a.** the U.S. southwest.
 - b.** Florida.
 - c.** northern California.
 - d.** the U.S. midwest.
- _____ **15.** A destructive, rotating column of air that has very high wind speeds and that may be visible as a funnel-shaped cloud is a(n)
- a.** thunderstorm.
 - b.** hurricane.
 - c.** anticyclone.
 - d.** tornado.
- _____ **16.** An anemometer is an instrument that measures
- a.** wind speed.
 - b.** water temperature.
 - c.** wind direction.
 - d.** humidity.
- _____ **17.** A package of instruments that is carried aloft by balloons to measure upper atmospheric conditions is
- a.** radar.
 - b.** a radiosonde.
 - c.** a weather balloon.
 - d.** a weather satellite.
- _____ **18.** Meteorologists have tried to control all of the following EXCEPT
- a.** lightning.
 - b.** rain.
 - c.** tornadoes.
 - d.** hurricanes.
- _____ **19.** The front edge of an advancing warm air mass that replaces colder air with warmer air is a(n)
- a.** warm front.
 - b.** occluded front.
 - c.** cold front.
 - d.** stationary front.
- _____ **20.** What do meteorologists use to store weather data from around the world and to create models to forecast weather?
- a.** satellites.
 - b.** radiosonde.
 - c.** radar.
 - d.** supercomputers.

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|------------------------|--|
| _____ 1. topography | a. the warm-water phase of the ENSO |
| _____ 2. monsoon | b. the average weather conditions in an area over a long period of time; described by temperature and precipitation |
| _____ 3. El Niño | c. the amount of energy required to change the temperature of 1 g of a substance by 1°C |
| _____ 4. climate | d. the surface features of land |
| _____ 5. microclimate | e. the climate of a small area |
| _____ 6. specific heat | f. seasonal winds that cause both floods and drought |

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|------------------------------|--|
| _____ 7. ice cores | a. where evidence of past climate is found, high ¹⁸ O levels in shells of microorganisms indicate cool water, while lower levels indicate warm water |
| _____ 8. fossils | b. where evidence of past climate is found in remains of plants and animals which had adaptations to a particular environment's climate |
| _____ 9. tree rings | c. where evidence of past climate is found in concentrations of gases in ice and meltwater |
| _____ 10. sea-floor sediment | d. where evidence of past climate is seen in their width |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Two major factors used to describe climate are
- a.** temperature and precipitation.
 - b.** high temperature and low temperature.
 - c.** season and temperature.
 - d.** season and precipitation.

Concept Review *continued*

- _____ **12.** What type of climates are the climates rain forest, desert and savanna?
a. middle-latitude
b. polar
c. arctic
d. tropical
- _____ **13.** City climates are sometimes a few degrees warmer than surrounding rural climates because pavement and buildings
a. block winds.
b. absorb and reradiate solar energy.
c. prevent the movement of clouds and precipitation.
d. act as solar panels to absorb heat.
- _____ **14.** Which of the following is NOT a potential impact of climate change?
a. global warming
b. precipitation change
c. sea-level change
d. Earth tilt variation
- _____ **15.** Marine west coast, steppe, humid continental, humid tropical, and mediterranean are all examples of
a. polar climate.
b. tundra climate.
c. tropical climate.
d. middle-latitude climate.
- _____ **16.** The temperature of the land or ocean affects the temperature of the air above it, which in turn affects the
a. weather.
b. precipitation.
c. climate.
d. wind patterns.
- _____ **17.** Plate tectonics, orbital change, human activity, and volcanic activity all cause changes in
a. climate.
b. weather.
c. the shape of Earth.
d. the movement of the ocean currents.
- _____ **18.** To counter the effects of global warming, humans can do all of the following EXCEPT
a. recycle.
b. conserve energy.
c. reforest.
d. change weather patterns.
- _____ **19.** Polar climates include all of the following subclimates EXCEPT
a. superarctic.
b. tundra.
c. subarctic.
d. polar icecap.
- _____ **20.** The sun's rays strike Earth at a wide angle year-round
a. in polar regions.
b. at the equator.
c. at middle latitudes.
d. in arctic regions.

Concept Review

In the space provided, write the letter of the definition that best matches the term or phrase.

- | | |
|-----------------------------------|---|
| _____ 1. refracting telescope | a. a large collection of stars, dust, and gas held together by gravity |
| _____ 2. rotation | b. the scientific study of the universe |
| _____ 3. X rays | c. the spin of a body on its axis |
| _____ 4. solstice | d. an instrument that uses a curved mirror to gather and focus light from distant objects |
| _____ 5. astronomy | e. the moment when the sun appears to cross the celestial equator |
| _____ 6. reflecting telescope | f. one complete trip of a body along an orbit |
| _____ 7. electromagnetic spectrum | g. all of the wavelengths of electromagnetic radiation |
| _____ 8. equinox | h. an instrument that uses a set of lenses to gather and focus light from distant objects |
| _____ 9. galaxy | i. the point at which the sun is as far north or as far south of the equator as possible |
| _____ 10. revolution | j. some invisible wavelengths of the electromagnetic spectrum |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Which of the following statements is correct?
- a. Astronomers use only visible electromagnetic radiation to study space.
 - b. Only invisible electromagnetic radiation is useful in space study.
 - c. Both visible and invisible electromagnetic radiation are analyzed to study space.
 - d. Neither visible nor invisible electromagnetic radiation is useful for space study.
- _____ 12. Which provides evidence of Earth's rotation?
- a. the shifting of constellations in the sky over several weeks
 - b. the period between successive full moons
 - c. the change of seasons
 - d. Foucault's pendulum

Concept Review *continued*

- _____ **13.** The average distance between Earth and the sun is known as a(n)
a. light-year.
b. astronomical unit.
c. big bang.
d. aphelion.
- _____ **14.** Leap years were established because
a. a complete rotation of Earth takes more than 24 hours.
b. a year is 365 days and one revolution takes 365 1/4 days.
c. a month is 30 or 31 days and a lunar month is only 29.5 days.
d. the Romans wanted to create a day to honor Julius Caesar.
- _____ **15.** The vernal equinox occurs on
a. March 21 or 22.
b. June 21 or 22.
c. September 22 or 23.
d. December 21 or 22.
- _____ **16.** Which is evidence that Earth revolves around the sun?
a. The path of a pendulum appears to change over time.
b. Wind belts and ocean currents curve.
c. We can feel Earth moving.
d. Constellations appear to change position over several weeks.
- _____ **17.** NASA's research on the flow of fluids through rockets led to
a. improved medical equipment.
b. automobile navigation systems.
c. smaller and lighter televisions.
d. powerful radio telescopes.
- _____ **18.** Because of Earth's atmosphere, telescopes for invisible electromagnetic radiation
a. work best on Earth's surface.
b. do not work at high elevations.
c. have been launched into space.
d. are not effective in studying space.
- _____ **19.** How many time zones has Earth's surface has been divided into?
a. 10
b. 15
c. 24
d. 360
- _____ **20.** Daylight time is shorter in the winter than in the summer because of
a. Earth's elliptical orbit.
b. Earth's simultaneous rotation and revolution.
c. Earth's spherical shape.
d. the tilt of Earth's axis.

Skills Worksheet

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|---------------------------------------|--|
| _____ 1. outer planets | a. planets characterized by solid rock with metallic cores, zero to two moons, and impact craters |
| _____ 2. Ptolemy | b. principle stating that each planet orbits the sun in a closed curve whose shape is determined by two foci |
| _____ 3. inner planets | c. small bodies from which planets originated in the early stages of development of the solar system |
| _____ 4. planetesimals | d. astronomer who believed that planets revolve around the sun, but at different speeds and distances from it |
| _____ 5. nebular hypothesis | e. planets characterized by massive size, relatively low density, thick atmospheres of helium and hydrogen, and rock and metal cores |
| _____ 6. Kepler's law of ellipses | f. law that the cube of the average distance of a planet from the sun is proportional to the square of its orbital period |
| _____ 7. Kepler's law of periods | g. principle stating that equal areas are covered in equal amounts of time as an object orbits the sun |
| _____ 8. differentiation | h. theory that the sun and planets condensed at about the same time out of a rotating cloud of gas and dust |
| _____ 9. Copernicus | i. astronomer who believed that planets move in epicycles as they move in larger circles around the Earth |
| _____ 10. Kepler's law of equal areas | j. the process by which Earth formed three distinct layers: a dense core of iron and nickel, a thick layer of iron- and magnesium-rich rock, and a thin crust of silica-rich rock |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Earth's atmosphere formed as volcanic eruptions released nitrogen, water vapor, sulfur dioxide, carbon dioxide, ammonia,
- | | |
|---------------------------------|----------------------------------|
| a. helium, and hydrogen. | c. hydrogen, and methane. |
| b. methane, and argon. | d. argon, and helium. |

Concept Review *continued*

- _____ **12.** Water vapor in the atmosphere of early Earth cooled and condensed to form rain, which collected on Earth's surface, creating the first
- a.** lakes.
 - b.** rivers.
 - c.** streams.
 - d.** oceans.
- _____ **13.** Newton's principle that a moving body will remain in motion and resist a change in speed or direction until an outside force acts upon it is called
- a.** gravity.
 - b.** inertia.
 - c.** ellipse.
 - d.** resistance.
- _____ **14.** The solar system body that has a moon half its size, is characterized by an unusually elongated orbit, and has a thin, nitrogen atmosphere, is
- a.** Mercury.
 - b.** Mars.
 - c.** Pluto.
 - d.** Neptune.
- _____ **15.** On which two planets have massive storms called, respectively, the Great Red Spot and the Great Dark Spot existed?
- a.** Mercury and Venus
 - b.** Jupiter and Saturn
 - c.** Venus and Saturn
 - d.** Jupiter and Neptune
- _____ **16.** Known for its rings and bands, the least dense planet is
- a.** Neptune.
 - b.** Uranus.
 - c.** Venus.
 - d.** Saturn.
- _____ **17.** A gas giant with a distinctive blue-green color indicating the presence of methane in its helium and hydrogen atmosphere is
- a.** Uranus.
 - b.** Mars.
 - c.** Mercury.
 - d.** Jupiter.
- _____ **18.** Which of the following make it possible for Earth to support life?
- a.** oxygen, land, water
 - b.** temperature, wind, water
 - c.** water, temperature, soil
 - d.** water, oxygen, temperature
- _____ **19.** Which inner planets have almost the same size, mass, and density?
- a.** Mars and Mercury
 - b.** Venus and Earth
 - c.** Mercury and Venus
 - d.** Earth and Mars
- _____ **20.** Which planets show evidence of heavy volcanic activity?
- a.** Mars and Venus
 - b.** Earth and Mars
 - c.** Venus and Earth
 - d.** Mars and Mercury

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|-------------------------|--|
| _____ 1. asteroid | a. the point at which a satellite is farthest from Earth |
| _____ 2. eclipse | b. the change in the illuminated area of one celestial body as seen from another celestial body |
| _____ 3. <i>Voyager</i> | c. a planet that has a small number of clumpy rings |
| _____ 4. apogee | d. spacecraft that first sent images of Io's volcanoes to Earth |
| _____ 5. crater | e. planet that has many thin complex rings, each with its own orbit |
| _____ 6. Saturn | f. surface layer of the moon; about 60 km thick on the near side and up to 100 km thick on the far side |
| _____ 7. crust | g. a bowl-shaped depression that forms on the surface of an object when a falling body strikes the object's surface |
| _____ 8. phase | h. a small, rocky object; orbits the sun |
| _____ 9. Neptune | i. an event in which the shadow of one celestial body falls on another |
| _____ 10. comet | j. a small body of rock, ice, and cosmic dust that follows an elliptical orbit around the sun |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Tides on Earth are caused by
- Earth's magnetic force alone.
 - Earth's inertial force and the moon's gravitational force.
 - Earth's gravitational force and the moon's inertial force.
 - the moon's gravitational force alone.
- _____ 12. When a meteoroid hits Earth, it is called a(n)
- asteroid.
 - meteorite.
 - comet.
 - meteor.

Concept Review *continued*

- _____ **13.** The idea that the moon's development began when a large object collided with Earth is called the
- a.** orbital collision hypothesis.
 - b.** orbital impact hypothesis.
 - c.** giant impact hypothesis.
 - d.** giant collision hypothesis.
- _____ **14.** The moon today looks as it did 3 billion years ago because
- a.** the moon cooled more than 3 billion years ago.
 - b.** the moon's surface was molten rock 3 billion years ago.
 - c.** the moon's mantle was formed over 3 billion years ago.
 - d.** a crust formed to protect the interior 3 billion years ago.
- _____ **15.** Which of the following is characteristic of Phobos and Deimos, Mars's moons?
- a.** They are relatively smooth chunks of rock.
 - b.** They orbit Mars quickly and in opposite directions.
 - c.** They orbit Mars slowly and in opposite directions.
 - d.** They were formed fairly recently.
- _____ **16.** Which of the following is NOT characteristic of one of the Galilean moons?
- a.** Io has active volcanoes.
 - b.** Ganymede has lava plains.
 - c.** Europa is covered by an ice sheet.
 - d.** Callisto is densely cratered.
- _____ **17.** The Oort cloud surrounds the solar system and contains
- a.** billions of asteroids.
 - b.** billions of comets.
 - c.** billions of meteorites.
 - d.** billions of stars.
- _____ **18.** A bright streak of light that results when a meteoroid burns up in Earth's atmosphere is called a
- a.** shooting star.
 - b.** fireball.
 - c.** meteor.
 - d.** meteor shower.
- _____ **19.** Which of the following is NOT a type of meteorite?
- a.** stony
 - b.** iron
 - c.** stony-iron
 - d.** magnetic
- _____ **20.** The Kuiper Belt is located
- a.** between Mercury and Venus.
 - b.** between Earth and the moon.
 - c.** between Neptune and Pluto.
 - d.** beyond Neptune's orbit.

Skills Worksheet

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|--------------------------------|--|
| _____ 1. corona | a. a dark, cooler area of the photosphere of the sun, with a strong magnetic field |
| _____ 2. aurora | b. the most violent solar disturbance; an eruption of electrically charged particles |
| _____ 3. photosphere | c. the sun's visible surface |
| _____ 4. sunspot | d. the region of the sun's interior between the radiative zone and the photosphere |
| _____ 5. coronal mass ejection | e. a loop of relatively cool incandescent gas that extends above the photosphere |
| _____ 6. solar flare | f. the zone of the sun's interior between the core and the convective zone |
| _____ 7. radiative zone | g. the outermost layer of the sun's atmosphere |
| _____ 8. chromosphere | h. the thin layer of the sun's gases just above the photosphere |
| _____ 9. convective zone | i. colored light caused by the reaction of solar wind particles with Earth's upper atmosphere |
| _____ 10. prominence | j. a part of coronal gas thrown into space from the sun's corona |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. One final product of the sun's energy-producing process is always
- a.** a helium nucleus.
 - b.** an oxygen nucleus.
 - c.** an iron nucleus.
 - d.** a carbon nucleus.
- _____ 12. The sun converts matter into energy in its core by
- a.** exposing matter to strong magnetic fields.
 - b.** the fusion of nuclei, which gives off energy.
 - c.** nuclear fission, which gives off energy.
 - d.** crushing it with extreme pressure.
- _____ 13. The most common nuclear reaction inside the sun is the
- a.** fission of uranium into hydrogen.
 - b.** fusion of nuclei and electrons.
 - c.** fission of hydrogen into helium.
 - d.** fusion of hydrogen nuclei into helium.

Concept Review *continued*

- _____ **14.** How do the temperatures of the radiative zone and the convection zone compare?
- The radiative zone is hotter.
 - The convection zone is hotter.
 - The convection zone is cooler.
 - The radiative zone is cooler.
- _____ **15.** Magnetic fields produced in the sun's convection zone
- slow convection, increasing transfer of energy from the core.
 - slow convection, decreasing transfer of energy from the core.
 - speed convection, decreasing transfer of energy from the core.
 - speed convection, increasing transfer of energy from the core.
- _____ **16.** What is the approximate temperature of the sun's core?
- 15,000°C
 - 200,000,000°C
 - 15,000,000°C
 - 20,000,000°C
- _____ **17.** What causes magnetic fields on the sun?
- coronal mass ejections
 - Earth's magnetic fields
 - the movement of gases and the sun's rotation
 - powerful magnetic poles on the sun
- _____ **18.** What causes an aurora?
- the visible light given off by the sun
 - colored lights seen on the sun
 - interaction between the corona and a sunspot
 - interaction between the solar wind and Earth's magnetosphere
- _____ **19.** The sun is composed mostly of
- hydrogen and carbon.
 - hydrogen and helium.
 - carbon and helium.
 - helium and oxygen.
- _____ **20.** Where are auroras most commonly seen on Earth?
- close to Earth's magnetic poles
 - close to the equator
 - only in the Southern Hemisphere
 - only near the tropics

Concept Review

In the space provided, write the letter of the description that best matches the term or phrase.

- | | |
|------------------------------|---|
| _____ 1. big bang theory | a. star group that can be elongated like a stretched-out football |
| _____ 2. constellation | b. the brightness a star would have at a distance of 32.6 light-years from Earth |
| _____ 3. light-year | c. the time in the life of a star when it generates energy by the fusion of hydrogen into helium in its core |
| _____ 4. spiral galaxy | d. an extremely bright area located in the center of some galaxies |
| _____ 5. absolute magnitude | e. the distance light travels in a single year |
| _____ 6. irregular galaxy | f. star group that has low mass, no particular shape, and is rich in dust and gas |
| _____ 7. elliptical galaxy | g. the idea that all matter and energy was compressed into a small volume and then exploded billions of years ago |
| _____ 8. main sequence stage | h. a fixed pattern of stars and the region of space around it |
| _____ 9. apparent magnitude | i. star group with a nucleus of bright stars and flattened arms that encircle the nucleus |
| _____ 10. quasar | j. the brightness of a star as seen from Earth |

In the space provided, write the letter of the answer choice that best completes each statement or best answers each question.

- _____ 11. Which stars have left the main sequence?
- a. nebula, nuclei, plasma
 - b. giants, supergiants, white dwarfs
 - c. quasars, pulsars, constellations
 - d. planets, galaxies, nova
- _____ 12. How far away is the closest galaxy to the Milky Way?
- a. 17,000,000 miles
 - b. 5 million light-years
 - c. 170,000 light-years
 - d. 5 billion kilometers

Concept Review *continued*

- _____ **13.** Why are scientists able to use spectra to determine the composition of stars?
- a.** because all stars have the same composition as Earth
 - b.** because every chemical element has a characteristic spectrum
 - c.** because chemical elements do not have characteristic spectra
 - d.** because colors and lines in the spectrum of stars are all the same
- _____ **14.** What did Hubble discover that indicated that the universe is expanding?
- a.** Only stars in the main sequence are moving away from Earth.
 - b.** Galaxies are moving closer to Earth.
 - c.** Spectras of galaxies were shifted toward the blue end.
 - d.** Spectras of galaxies were shifted toward the red end.
- _____ **15.** What type of star may become a pulsar?
- a.** a neutron star
 - b.** the sun
 - c.** a white dwarf
 - d.** a nebula
- _____ **16.** What indicates the surface temperature of a star?
- a.** the star's mass
 - b.** the star's age
 - c.** the star's distance from Earth
 - d.** the star's color
- _____ **17.** What marks the transition of a protostar to a star?
- a.** the end of nuclear fusion
 - b.** the beginning of nuclear fusion
 - c.** the beginning of nuclear fission
 - d.** the end of nuclear fission
- _____ **18.** Which of these is considered to be evidence of the big bang?
- a.** absolute zero
 - b.** the existence of black dwarf stars
 - c.** cosmic background radiation
 - d.** the asteroid belt
- _____ **19.** What is a nova?
- a.** a main-sequence star
 - b.** a black hole
 - c.** a star that suddenly becomes brighter
 - d.** a nebula
- _____ **20.** Why do stars appear to move in the sky?
- a.** because of the movement of Earth
 - b.** because of the big bang
 - c.** because they are actually moving closer to Earth
 - d.** because of the movement of the sky