

SCIENCE

A CLOSER LOOK

Grade 6 Reading Essentials Answer Key

CHAPTER 1 CLASSIFYING LIVING THINGS

Lesson 1 Classifying Plants and Animals

Read a Diagram: Classification of *Canis lupus*
kingdom (p. 5)
species (p. 5)

Read a Diagram: Plants and Fungi
mushrooms (p. 6)

Quick Check

1. organism (p. 3)
2. cell (p. 3)
3. energy (p. 3)
4. reproduce (p. 3)
5. phylum (p. 5)
6. Latin (p. 5)
7. vascular (p. 6)
8. fungi (p. 6)
9. Viruses are not alive. They are not made of cells. (p. 7)

Lesson 2 Plants

Read a Diagram: How Materials Move Through a Plant
xylem (p. 9)

Read a Diagram: Life Cycle of a Moss
A plant with a spore case grows and then the spore case releases spores. (p. 14)

Quick Check

10. roots (p. 9)
11. holding a plant in the ground (p. 9)
12. chloroplasts (p. 11)
13. glucose and oxygen (p. 11)
14. in the ovary (p. 13)
15. Spores do not contain food for the young plant, but seeds do. (p. 13)
16. different: reproduce using flowers; fruit, vegetables, grains, most nuts (p. 15)
17. alike: vascular plants (p. 15)
18. different: reproduce using cones; trees (p. 15)
19. roots (p. 17)
20. stems (p. 17)

- 21. leaves (p. 17)
- 22. seeds (p. 17)

Lesson 3 Animals

Read a Diagram: Marine Invertebrates
in the ocean (p. 21)

Read a Photo: Parts of an Insect
the head (p. 23)

Quick Check

- 23. A chordate is an animal with a nerve cord. (p. 18)
- 24. An endoskeleton supports the animal and helps it move. (p. 18)
- 25. No. (p. 19)
- 26. invertebrates (p. 21)
- 27. crustaceans (p. 23)

Lesson 4 Animal Systems

Read a Photo: Energy from Food
ingestion

Read a Diagram: Human Respiratory System
nose, mouth, pharynx, larynx, and trachea (p. 27)

Quick Check

- 28. in the mouth, stomach, and small intestine (p. 25)
- 29. amphibians (p. 27)
- 30. circulation (p. 29)
- 31. gills (p. 29)
- 32. different: outside body; hard covering (p. 31)
- 33. alike: protects and helps animal move (p. 31)
- 34. different: inside body; muscles attach to bone (p. 31)

Lesson 5 Plant and Animal Adaptations

Read a Photo: Adaptation
White feathers act as camouflage in snow. (p. 35)
Down feathers keep the bird warm. (p. 35)

Read a Photo: Adaptive Behavior
the lizard on the right (p. 36)

Quick Check

- 35. tropism (p. 33)
- 36. attract pollinators or reproduce (p. 33)
- 37. phototropism (p. 33)
- 38. Adaptations allow them to survive. (p. 35)
- 39. An instinct is a behavior that an animal is born with. (p. 36)
- 40. migrate (p. 37)

Chapter 1: Vocabulary Review

Page 38

1. d
2. f
3. a
4. b
5. e
6. g
7. c
8. j
9. k
10. i
11. h

Page 39

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

Summarize

Living things are grouped by their characteristics. Plants have structures that carry out certain jobs. In the leaves, they use sunlight to make their own food. Animals can be grouped by whether or not they have backbones. Animals have organ systems that do certain jobs. Plants and animals adapt, or change, to survive in their environments.

CHAPTER 2 CELLS

Lesson 1 Cell Theory

Read a Photo: Types of Tissue

Possible answer: They are different colors. Connective tissue is very thick and nerve tissue isn't. (p. 44)

Read a Graph: Contents of Human Cells
water (p. 46)

Quick Check

1. Robert Hooke (p. 43)
2. He discovered unicellular organisms. (p. 43)
3. tissue (p. 44)
4. Possible answer: brain, heart, skin, and lungs (p. 45)
5. F (p. 47)
6. T (p. 47)

Lesson 2 Plant and Animal Cells

Read a Diagram: Plant Cell
cytoplasm (p. 49)

Read a Diagram: Photosynthesis

glucose (p. 52)
oxygen (p. 52)

Quick Check

7. cell wall (p. 49)
8. chlorophyll (p. 49)
9. chloroplasts (p. 49)
10. diffusion, osmosis (p. 51)
11. in the chloroplasts (p. 52)
12. the Sun's energy (p. 52)
13. F (p. 53)
14. F (p. 53)
15. Substance particles move away from areas of low concentration to areas of high concentration. (p. 55)
16. Cells' energy is not used. (p. 55)

Lesson 3 Cell Division

Read a Diagram: Mitosis
metaphase (p. 59)

Read a Table: Life Expectancy and Life Span
life span (p. 63)

Quick Check

17. cell cycle (p. 57)
18. cells (p. 57)
19. cell membrane (p. 57)
20. F (p. 59)
21. T (p. 59)
22. sex cell (p. 61)
23. four (p. 61)
24. one (p. 62)
25. life span (p. 63)
26. life expectancy (p. 63)
27. life cycle (p. 63)

Lesson 4 Microorganisms

Read a Photo: "Living Rocks"
They may have once lived on the ocean floor. (p. 65)

Read a Photo: Binary Fission
Step 3: Two identical cells result. (p. 66)

Quick Check

28. F (p. 64)
29. F (p. 64)
30. two (p. 65)
31. binary fission (p. 66)
32. hyphae (p. 67)

Chapter 2: Vocabulary Review

Page 68

1. meiosis
2. osmosis
3. cellular respiration
4. cell
5. diffusion
6. budding
7. mitosis
8. cell cycle
9. microorganism

Page 69

1. conjugation
2. binary fission
3. compound
4. organ system
5. tissue

Summarize

All living things are made of cells. Cells have structures that work together to carry out life processes. Each structure has a certain job. Cells reproduce by cell division. Microorganisms are living things that cannot be seen without a microscope. Microorganisms include some fungi, most protists, and bacteria.

CHAPTER 3 GENETICS

Lesson 1 How Traits Are Controlled

Read a Photo: Acquired Traits and Inherited Traits

The baby flamingo had white feathers. (p. 73)

Read a Diagram: Mendel's Experiments

Three tall offspring (Tt, Tt, TT) are usually produced for every one short offspring (tt). (p. 75)

Quick Check

1. heredity (p. 72)
2. genetics (p. 72)
3. after it is born (p. 73)
4. hidden (p. 75)
5. gene (p. 76)
6. trait (p. 76)
7. 25 percent, or one in four (p. 77)
8. one (p. 77)
9. one (p. 77)
10. Possible answer: People want organisms that have certain traits, so they breed those organisms that have the desired traits instead of those that do not have the desired traits. (p. 79)

Lesson 2 Human Genetics

Read a Diagram: Sex Chromosomes

an X chromosome and a Y chromosome (p. 81)

Read a Diagram: Pedigree for Tongue Rolling
younger son (p. 82)

Quick Check

11. c (p. 80)
12. b (p. 80)
13. a (p. 80)
14. T (p. 81)
15. F (p. 81)
16. when a gene or a set of genes changes (p. 83)
17. an extra chromosome (p. 83)

Lesson 3 Modern Genetics

Read a Diagram: Genes and DNA
pairs of bases (p. 85)

Read a Diagram: Gene Splicing
It is able to produce human insulin. (p. 86)

Quick Check

18. genome (p. 85)
19. Possible answers: produce more food, have more nutrients, fight disease and insects, need fewer chemical pesticides (p. 87)

Lesson 4 Genetic Change over Time

Read a Diagram: Darwin's Finches
the large ground finch (p. 89)

Read a Photo: Color Adaptations
Possible answer: The rabbits would no longer blend into their environment. This would make it harder for them to hide from danger and find food. (p. 90)

Quick Check

20. The individuals with the harmful traits will not survive long enough to reproduce. (p. 89)
21. Possible answer: Antibiotics kill only the bacteria that are not resistant. If a person stops taking the antibiotic too soon, antibiotic-resistant bacteria survive and reproduce. (p. 91)

Chapter 3: Vocabulary Review

Page 92

1. e
2. a
3. f
4. k
5. c
6. i
7. b
8. j
9. g
10. d

11. h

Page 93

1. c

2. d

3. a

4. d

5. c

6. b

Summarize

Inherited traits are passed from parents to offspring. Information in the genes from each parent determines someone's inherited traits. DNA is the genetic material in genes and chromosomes in the cell. It determines traits and tells the cell what to do. There are genetic variations in species. Mutations and environmental factors bring about these differences.

CHAPTER 4 ECOSYSTEMS

Lesson 1 Earth's Ecosystems

Read a Diagram: The Nitrogen Cycle

Bacteria change the nitrogen into compounds that plants can use. (p. 99)

Read a Photo: Fish Floss

The fish seem to be eating parasites or dead skin on the hippopotamus. The fish are protected from predators by staying close to the hippopotamus. The hippopotamus has parasites and dead skin removed, which is good for its health. (p. 101)

Quick Check

1. biotic (p. 97)

2. abiotic (p. 97)

3. nitrogen fixation (p. 99)

4. bacteria (p. 99)

5. F (p. 101)

6. F (p. 101)

7. Different species eat different foods, use different materials for shelter, and have different ways of finding food. (p. 103)

Lesson 2 Food Chains, Webs, and Pyramids

Read a Diagram: Forest Food Chain

mushroom: dead plants and animals (p. 105)

grasshopper: producers (plant) (p. 105)

blue jay: primary consumers (grasshopper) (p. 105)

bob cat: secondary consumers (blue jay) (p. 105)

Read a Diagram: Land Food Chain

It is a predator to the mouse and the insects. It is prey for the hawk. (p. 106)

Quick Check

8. decomposer (p. 105)

9. producer (p. 105)

10. consumer (p. 105)

11. food web (p. 106)
12. A predator hunts and kills its prey. A scavenger eats a dead animal that it did not kill. (p. 106)
13. The top level is smaller than the bottom level because there are fewer consumers than producers. This is because only 10 percent of the energy is passed from one level to the next. (p. 107)

Lesson 3 Comparing Ecosystems

Read a Map: Earth's Biomes
deciduous forest (p. 108)

Read a Diagram: Zones of Ocean Life
oceanic zone (p. 117)

Quick Check

14. climate (p. 109)
15. biome (p. 109)
16. areas near the equator (p. 109)
17. areas near the poles (p. 109)
18. T (p. 111)
19. F (p. 111)
20. prairie (p. 112)
21. not as hot, lots of rain (p. 113)
22. near the equator (p. 113)
23. very little (p. 114)
24. moving (p. 114)
25. wetlands (p. 115)
26. estuaries (p. 115)
27. at the top (p. 116)
28. in the middle (p. 116)
29. on the bottom (p. 116)
30. plankton (p. 117)

Lesson 4 Changes in Ecosystems

Read a Diagram: Stages of Succession
grasses and flowering plants (p. 123)

Read a Diagram: Homologous Structures
humerus, radius, ulna, and phalanges (p. 125)

Quick Check

31. abiotic and biotic (p. 119)
32. They can damage the environment and compete with native species for resources. (p. 119)
33. extinct (p. 121)
34. biodiversity (p. 121)
35. pioneer species (p. 123)
36. climax community (p. 123)
37. homologous structures (p. 125)
38. Wetlands are home to many living things. Wetlands help clean pollution from water. Wetlands can absorb water and prevent floods. (p. 126)
39. desertification (p. 127)

Chapter 4: Vocabulary Review

Page 128

1. community
2. limiting factor
3. producer
4. energy pyramid
5. predator
6. food chain
7. succession
8. biome
9. extinct
10. consumer
11. decomposer
12. climax community

Page 129

Down

1. ecosystem
3. abiotic
4. food web
6. scavenger

Across

2. pioneer community
5. symbiosis
7. population
8. biotic

Summarize

In an ecosystem, living and nonliving things have relationships. Food chains show how energy from the Sun moves from one organism to another. Food webs show how food chains are connected. Organisms can only live in environments for which they are suited. Ecosystems change over time because of natural factors and human activities.

CHAPTER 5 CHANGES OVER TIME

Lesson 1 Features of Earth

Read a Photo: Earth's Water

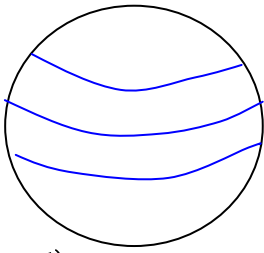
Liquid water is blue. Ice (solid) and water vapor in clouds (gas) are white (p. 132)

Read a Map: Elevation

pink or beige (p. 137)

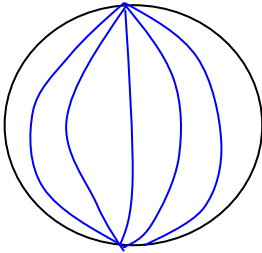
Quick Check

1. c (p. 133)
2. a (p. 133)
3. d (p. 133)
4. b (p. 133)
5. plateaus (p. 135)
6. Great Plains (p. 135)
7. Draw latitude lines on this globe



(p. 136)

8. Draw longitude lines on this globe



(p. 136)

9. elevation (p. 137)

10. crust (p. 139)

11. mantle (p. 139)

12. core (p. 139)

Lesson 2 Earth's Moving Continents

Read a Map: Fossil Evidence of Continental drift

Long ago all the pieces of land were one big continent. (p. 140)

Read a Map: Tectonic-Plate Movement

toward each other (p. 146)

Quick Check

13. plates (p. 141)

14. sideways (p. 141)

15. mid-ocean ridges (p. 143)

16. seafloor spreading (p. 143)

17. divergent (p. 144)

18. convergent (p. 144)

19. transform boundary (p. 145)

20. subduction (p. 145)

21. divergent boundary	Mid-Atlantic Ridge
22. convergent boundary	Alps
23. transform boundary	San Andreas Fault

(p. 147)

Lesson 3 Forces That Build the Land

Read a Diagram: Kinds of Faults

strike-slip fault (p. 149)

Read a Map: Earthquake Locations

Most major earthquakes happen at the coastline of the Pacific Ocean. (p. 150)

Quick Check

24. A fault is a break in rock where movement happens. (p. 149)
25. focus (p. 150)
26. The greatest damage happens near the epicenter because that's where the shaking is strongest. (p. 151)
27. A pen is attached to a spring that moves when Earth shakes. The pen makes marks on paper that show how much Earth shakes. (p. 153)
28. tsunami (p. 155)
29. vent; lava (p. 157)
30. dike (p. 159)

Lesson 4 Forces That Shape Earth

Read a Diagram: How a Cave Forms
acid in rain (p. 161)

Read a Diagram: The Life of a Stream

When the stream reaches flatter land, it slows down and leaves sediment behind. (p. 165)

Quick Check

31. ice, moving water, plants (p. 161)
32. Oxygen combines with iron in some rocks. The rusty rocks break apart more easily than other rocks. (p. 161)
33. c (p. 163)
34. b (p. 163)
35. a (p. 163)
36. glacier (p. 165)
37. moraine (p. 165)
38. topsoil, subsoil, parent rock, bedrock (p. 167)
39. F (p. 169)
40. T (p. 169)
41. F (p. 169)

Lesson 5 Changes in Geology over Time

Read a Diagram: How Fossils Form

Sediment buries dead plants and animals. Minerals in the sediment change the hard parts of the plant or animal into rock. (p. 172)

Read a Graph: Half-life
25 percent (p. 174)

Quick Check

42. Changes to rock layers caused by plate movements can make it hard for scientists to tell a rock's age. (p. 171)
43. 2 (p. 173)
44. 1 (p. 173)
45. 3 (p. 173)

46. Paleozoic era (p. 175)
47. Mesozoic era (p. 175)
48. T (p. 177)
49. F (p. 177)
50. T (p. 177)
51. F (p. 177)

Chapter 5: Vocabulary Review

Page 178

1. vent
2. epicenter
3. longitude
4. continental drift
5. magma
6. weathering
7. fossil

Page 179

Down

1. lithosphere
2. erosion
3. latitude
4. mantle

Across

5. seismograph

Summarize

Earth is made of layers. Its surface has many kinds of landforms. Continental drift has caused the continents to be where they are today. Faults, earthquakes, volcanoes, weathering, erosion, and deposition also change Earth's surface.

CHAPTER 6 CONSERVING OUR RESOURCES

Lesson 1 Minerals and Rocks

Read a Diagram: Crystal Structures

Iron pyrite is shiny. It has a cubic crystal structure. (p. 183)

Read a Diagram: Mohs' Hardness Scale

Calcite is softer than feldspar. (p. 184)

Quick Check

1. Table salt, copper wire, and diamonds are alike because they are all made of minerals. (p. 183)
2. color, cleavage (p. 183)
3. hardness (p. 185)
4. streak (p. 185)
5. coarse (p. 187)
6. structure (p. 187)
7. extrusive (p. 187)
8. metamorphic (p. 189)
9. sedimentary (p. 189)
10. Weathering breaks the rock into sediments. (p. 191)
11. Rock melts and turns into magma. (p. 191)

Lesson 2 Air and Water

Read a Diagram: How Earth's Atmosphere Supports Life
Plants give off oxygen. (p. 192)

Read a Diagram: Solar Energy and the Water Cycle
Water evaporates into the air. (p. 194)

Quick Check

- 12. ozone layer (p. 193)
- 13. wind (p. 193)
- 14. The water cycle moves water between Earth's surface and the air. (p. 195)
- 15. rain, sleet, hail, snow (p. 195)
- 16. A watershed is the area of land that furnishes water to a river or river system. (p. 195)
- 17. salt water (p. 197)
- 18. the water table (p. 197)
- 19. a (p. 199)
- 20. b (p. 199)

Lesson 3 Other Land Resources

Read a Photo: Clear-cutting
If more trees are not planted, there are no tree roots to hold the soil in place. (p. 204)

Read a Photo: Daily Garbage
Possible answers: paper, plastic bags, food, tree branches (p. 206)

Quick Check

- 21. b (p. 201)
- 22. c (p. 201)
- 23. a (p. 201)
- 24. Sometimes more sediment buries the lignite even deeper. More heat and pressure changes the lignite into bituminous coal. (p. 203)
- 25. oil, natural gas (p. 203)
- 26. Strip-mining scrapes away large areas of soil. Then rain can wash the soil into streams and lakes. (p. 205)
- 27. They pollute the air. They leak oil into the ground and ruin the soil. (p. 205)
- 28. biodegradable (p. 207)

Lesson 4 Saving Resources

Read a Diagram: Water Treatment
Chlorine kills germs in the water. (p. 209)

Read a Diagram: What We Throw Away
yard waste (p. 213)

Quick Check

What Farmers Do	How This Helps the Land
Farmers spread manure on fields.	29. This helps crops grow.

Farmers plant different crops each year in each field.	30. This keeps crops from using up all of the nutrients they need in the soil.
Farmers plant trees in rows at the tops of hills.	31. This keeps rain and wind from carrying soil away.

(p. 208)

32. People can recycle trash. (p. 209)

33. d (p. 211)

34. c (p. 211)

35. b (p. 211)

36. e (p. 211)

37. a (p. 211)

38. Reduce, Reuse, Recycle (p. 213)

Chapter 6: Vocabulary Review

Page 214

1. d

2. b

3. c

4. a

5. b

6. c

Page 215

1. crystal [9th row, starting with 2nd letter, diagonal]

2. igneous [10th row, starting with 1st letter]

3. sedimentary [top row, starting with 1st letter, diagonal]

4. metamorphic [top row, starting with last letter, down]

Summarize

The rock cycle changes one kind of rock to another over long periods of time. Air and water provide energy but can damage things people build. Earth has both renewable and nonrenewable resources. Pollution happens when we burn fossil fuels. We can conserve Earth's resources by using different farming methods and alternative energy sources and when we reduce, reuse, and recycle things we use.

CHAPTER 7 WEATHER AND CLIMATE

Lesson 1 The Atmosphere and Weather

Read a Diagram: Earth's Atmosphere
the stratosphere (p. 219)

Read a Diagram: Solar Warming
December (p. 221)

Quick Check

1. troposphere (p. 219)

2. weather variables (p. 219)

3. The Sun's rays are more direct at the equator. (p. 221)

4. T (p. 223)

5. F (p. 223)

- 6. F (p. 223)
- 7. trade winds (p. 225)

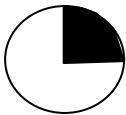
Lesson 2 Precipitation and Clouds

Read a Diagram: Kinds of Clouds
altostratus and altocumulus (p. 229)

Read a Diagram: How Lightning Forms
positive (p. 232)

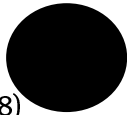
Quick Check

- 8. warm (p. 227)
- 9. cool (p. 227)
- 10.



(p. 228)

11.



(p. 228)

- 12. rain (p. 231)
- 13. sleet, snow, hail (p. 231)
- 14. Both start when warm air rises quickly. (p. 233)
- 15. A tornado has a funnel shape. (p. 233)
- 16. 120 kilometers per hour (75 miles per hour) (p. 234)
- 17. direction, speed, size of hailstones, kind of precipitation (p. 235)

Lesson 3 Predicting Weather

Read a Diagram: Air-Pressure Systems: Northern Hemisphere
in a clockwise direction (p. 237)

Read a Diagram: Three Kinds of Fronts
upward (p. 239)

Quick Check

- 18. c (p. 237)
- 19. a (p. 237)
- 20. b (p. 237)
- 21. T (p. 239)
- 22. T (p. 239)
- 23. F (p. 239)
- 24. b (p. 241)
- 25. d (p. 241)
- 26. c (p. 241)
- 27. a (p. 241)

Lesson 4 Climate

Page 243

Read a Diagram: Temperature and Precipitation
cold and wet (p. 243)

Read a Map: Major Ocean Currents

Peru (p. 244)
cold current (p. 244)

Quick Check

- 28. latitude (p. 243)
- 29. precipitation (p. 243)
- 30. climate (p. 243)

Climate Factors	How They Affect Climate
31. Water currents	Water currents warm or cool the air above them. Places near warm currents have warm climates. Places near cool currents often have cool climates.
32. Mountains	Air at the top of a high mountain is colder than the air at the bottom. Mountains can protect an area from cold winds. Wind patterns around mountains can affect precipitation.

(p. 245)

- 33. T (p. 247)
- 34. T (p. 247)

Chapter 7: Vocabulary Review

Page 248

- 1. air pressure
- 2. air mass
- 3. rain shadow
- 4. humidity
- 5. c
- 6. d
- 7. e
- 8. b
- 9. f
- 10. a

Page 249

- 1. t o r n a d o
- 2. i s o b a r
- 3. a t m o s p h e r e
- 4. c o n d e n s a t i o n
- 5. h u r r i c a n e

Precipitation, temperature, wind, and moisture in the air are all factors that affect the weather.

Summarize

Weather is the state of the troposphere at a certain place and time. Precipitation comes from clouds. Tornadoes and hurricanes are kinds of strong storms. Scientists watch high and low pressure areas and cold and warm fronts to predict weather changes. A place's average weather pattern over time is its climate.

CHAPTER 8 ASTRONOMY

Lesson 1 The Earth-Sun System

Read a Diagram: Two Kinds of Telescopes
reflecting telescope (p. 253)

Read a Map: U.S. Time Zones
6:00 (p. 255)

Quick Check

1. A telescope helps scientists find space objects that are far away and helps them see space objects better. (p. 253)
2. a reflecting telescope (p. 253)
3. F (p. 255)
4. T (p. 255)
5. the tilt of Earth's axis (p. 256)
6. Hubble (p. 257)
7. space shuttles (p. 257)
8. Earth (p. 257)

Lesson 2 The Earth-Sun-Moon System

Read a Diagram: Phases of the Moon
Days 8–9 and Days 23–24 (p. 261)

Page 263

Read a Diagram: Eclipses
solar eclipse (p. 263)

Quick Check

9. craters (p. 259)
10. maria (p. 259)
11. because a different amount of the Moon's lighted half can be seen as the Moon revolves around Earth (p. 260)
12. Moon, Earth (p. 263)
13. the pull objects have on each other (p. 265)
14. changes in the ocean's water level (p. 265)

Lesson 3 The Solar System

Read a Diagram: Solar System
Mercury (p. 266)

Read a Diagram: Comet's Path
The comet's tail gets longer. (p. 272)

Quick Check

15. Gravity pulls the planet toward the Sun. The planet's inertia keeps gravity from pulling it into the Sun. (p. 267)
16. Earth (p. 269)
17. Mars (p. 269)

18. a huge storm that has lasted more than 300 years (p. 270)
19. about 29 Earth years (p. 270)
20. Uranus (p. 271)
21. d (p. 273)
22. c (p. 273)
23. b (p. 273)
24. a (p. 273)

Lesson 4 Stars

Read a Diagram: The H-R Diagram
a blue supergiant (p. 277)

Read a Diagram: The Sun
the core (p. 281)
15,000,000°C (27,000,000°F) (p. 281)

Quick Check

25. gravity (p. 275)
26. the distance light travels in one year (p. 275)
27. Possible answers: brightness, size, color, temperature (p. 277)
28. protostar (p. 279)
29. black dwarf (p. 279)
30. supernova (p. 279)
31. F (p. 281)
32. F (p. 281)
33. T (p. 281)

Lesson 5 Galaxies and Beyond

Read a Diagram: Star Formation
It sends matter out in all directions. (p. 284)

Read a Diagram: How Our Solar System Formed
During step 2, the protoplanets formed and began to orbit the protostar (the young Sun). (p. 285)

Quick Check

34. c (p. 283)
35. a (p. 283)
36. b (p. 283)
37. expanding (p. 284)
38. gravity (p. 285)
39. A protoplanet is a young planet. (p. 285)

Chapter 8: Vocabulary Review

Page 286

1. telescope [2nd row, starting with 1st letter]
2. planet [5th row, starting with 6th letter]
3. galaxy [5th row, starting with 1st letter, down]
4. constellation [top row, starting with last letter, down]
5. crater [4th row, starting with 1st letter]
6. comet [4th row, starting with 1st letter, diagonal]

7. spectrum [bottom row, starting with 1st letter, diagonal]
8. gravity [bottom row, starting with 4th letter]
9. inertia [6th row, starting with 9th letter, down]

Page 287

1. g
2. d
3. i
4. b
5. h
6. c
7. j
8. f
9. e
10. a

Summarize

Earth's rotation and revolution cause days and seasons. The gravity of the Moon causes tides on Earth. The way the Moon looks changes over 29 days. The shadows and movements of Earth and the Moon cause eclipses. In our solar system, four inner planets, four outer planets, asteroids, comets, and meteoroids orbit the Sun. Stars have many colors, sizes, and shapes. The Sun is a star that developed like other stars. Our solar system is part of the Milky Way galaxy.

CHAPTER 9 CLASSIFYING MATTER

Lesson 1 Physical Properties

Read a Photo: How Heavy Ships Float

The ship has less density, because the ship floats. (p. 293)

Read a Photo: Physical Properties

conductivity (p. 295)

Quick Check

1. c (p. 291)
2. e (p. 291)
3. d (p. 291)
4. f (p. 291)
5. b (p. 291)
6. a (p. 291)
7. T (p. 293)
8. F (p. 293)
9. F (p. 293)
10. Possible answers: color, hardness, texture, odor, density, conductivity (p. 295)
11. Possible answers: copper, aluminum, gold, silver (p. 295)
12. Possible answers: glass, rubber, plastic (p. 295)

Lesson 2 Elements and Compounds

Read a Graph: Elements in the Human Body
carbon (p. 297)

Read a Diagram: Inside Atoms
Helium has two protons and two neutrons. (p. 299)

Quick Check

13. pure (p. 297)
14. cannot (p. 297)
15. hydrogen, oxygen (p. 297)
16. six (p. 297)
17. oxygen (p. 297)
18. neutron (p. 299)
19. proton (p. 299)
20. electron (p. 299)
21. Possible answers: any of the elements shown in blue (p. 301)
22. Possible answers: any of the elements shown in yellow (p. 301)
23. Possible answers: any of the elements shown in green (p. 301)
24. Sodium is a soft, silvery metal that explodes when it is put in water. Chlorine is a poisonous green gas. When they combine, they form a white crystal that is safe to eat. (p. 303)
25. water (p. 305)
26. salt (p. 305)
27. water (p. 305)

Lesson 3 Solid, Liquids, and Gases

Read a Diagram: Changes of State
0°C (32°F) (p. 307)

Read a Photo: Temperature and Volume
The balloon got smaller in the freezer because the molecules inside it slowed down. The space between the molecules got smaller so the gas took up less space. (p. 311)

Quick Check

28. temperature (p. 307)
29. It changes to a gas. (p. 307)
30. c (p. 309)
31. a (p. 309)
32. d (p. 309)
33. b (p. 309)
34. hot gases (p. 311)
35. F (p. 313)
36. T (p. 313)
37. T (p. 313)

Lesson 4 Water and Mixtures

Read a Photo: Mixtures in Water
soil and water (p. 316)

Read a Diagram: Making Distilled Water
The cold water lowers the temperature and causes the water vapor to condense. (p. 322)

Quick Check

38. In a mixture, substances blend physically without forming a new substance. In a compound, substances are combined chemically to form a new substance. (p. 315)
39. A heterogeneous mixture is a blend of substances that is not the same all the way through. (p. 315)
40. c (p. 317)
41. a (p. 317)
42. b (p. 317)
43. T (p. 319)
44. F (p. 319)
45. T (p. 319)
46. d (p. 321)
47. b (p. 321)
48. e (p. 321)
49. c (p. 321)
50. a (p. 321)
51. Distillation is a process that separates the parts of a mixture using vaporization and condensation. (p. 323)
52. Distillation works because salt and water have different boiling points. (p. 323)

Chapter 9: Vocabulary Review

Page 324

Across

1. proton
2. liquid
6. temperature
7. density

Down

1. periodic table
3. atom
4. gas
5. neutron
8. molecule

Page 325

1. b
2. c

3. a
4. b
5. d
6. a

Summarize

Matter has mass, weight, volume, and density. Other physical properties include color, hardness, boiling point, and texture. All matter is made of atoms. An atom has protons and neutrons in its nucleus and electrons that orbit around its nucleus. The periodic table shows the elements in order of their atomic numbers. Atoms combine to form molecules that are the smallest particles of a compound that still have the properties of that compound. Every element has a boiling point and a freezing point. Physical changes do not form new substances. A mixture combines two or more substances without forming a new substance.

CHAPTER 10 CHEMISTRY

Lesson 1 Chemical Changes

Read a Photo: Chemical Reaction
Hydrogen is a product. (p. 329)

Read a Photo: Endothermic Reaction
A battery is used to supply energy. (p. 333)

Quick Check

1. A reactant is the substance before it goes through a chemical change. (p. 329)
2. A product is the new substance made by a chemical change. (p. 329)
3. Substances combine to form new compounds. (p. 331)
4. A compound breaks apart into two or more simpler substances. (p. 331)
5. $\text{H}_2\text{CO}_3 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$ (p. 331)
6. $\text{Zn} + 2\text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2$ (p. 331)
7. a reaction that takes in energy (p. 333)
8. the welder's torch (p. 333)

Lesson 2 Chemical Properties

Read a Diagram: The pH Scale
tomato and lemon (p. 336)

Read a Photo: Cleaning Copper
The shiny part (left side) of the pot was cleaned with ketchup. (p. 337)

Quick Check

9. c (p. 335)
10. b (p. 335)
11. a (p. 335)
12. Litmus paper is a tool scientists use to test substances for acids or bases. (p. 337)
13. An acid makes blue litmus paper turn pink or red. (p. 337)
14. A base makes red litmus paper turn blue. (p. 337)
15. People use this salt to make sore muscles feel better. (p. 339)

16. barium sulfate (BaSO_4) (p. 339)
17. Butchers use this salt to help preserve or keep meat safe to eat. This salt is also sprinkled on icy roadways to help melt ice and snow. (p. 339)

Lesson 3 Carbon and Its Compounds

Read a Photo: Organic Compounds We Eat
meat, eggs, fish, and beans (p. 343)

Read a Photo: Synthetic Plastics

Possible answers: fenders, grill, turn-signal covers, wheel covers (p. 345)

Quick Check

18. c (p. 341)
19. a (p. 341)
20. b (p. 341)
21. T (p. 343)
22. F (p. 343)
23. T (p. 343)
24. T (p. 343)
25. nature (p. 345)
26. the horns of some animals (p. 345)
27. carbon, hydrogen, and either oxygen or silicon (p. 345)
28. keeps its shape (p. 345)
29. people (p. 345)
30. jewelry, automobile parts, toys, bottles, packaging, building materials (p. 345)

Lesson 4 Atoms and Energy

Read a Diagram: Kinds of Radiation
paper (p. 347)

Read a Diagram: Types of Nuclear Energy

Both nuclear fission and nuclear fusion are nuclear reactions that give off energy. (p. 349)

Quick Check

31. an isotope that has too much energy (p. 347)
32. the amount of time it takes for half of the isotope in a sample of an element to decay (p. 347)
33. fission (p. 349)
34. fusion (p. 349)
35. Doctors use radiation to find diseases and to kill cancer cells. (p. 351)
36. Nuclear reactors split atoms in controlled chain reactions (p. 351)

Chapter 10: Vocabulary Review

Page 352

1. plastic [4th row, starting with 11th letter, down]
2. base [8th row, starting with 3rd letter]
3. radiation [2nd row, starting with 7th letter, diagonal]
4. endothermic [2nd row, starting with 6th letter, down]
5. salt [6th row, starting with 3rd letter]
6. exothermic [2nd row, starting with 1st letter]
7. synthetic [1st row, starting with 13th letter, down]

8. product [6th row, starting with 1st letter, down]

Page 353

1. organic compound
2. nuclear fusion
3. chemical change
4. nuclear fission
5. acid
6. chemical equation
7. reactant
8. radioactive

Summarize

Chemical changes produce new substances. Synthesis, decomposition, and replacement are the three kinds of chemical reactions. Exothermic reactions give off energy, but endothermic reactions take in energy. Scientists use a periodic table to sort all the elements. People use acids, bases, and salts in their daily lives. Carbon compounds come from decaying plants, burning fuel, and animal waste. Three organic compounds that humans eat are carbohydrates, lipids, and proteins. Most plastics are synthetic organic compounds. Many radioactive rays can go through some materials. People can use radiation to find and kill cancer cells and to make energy through nuclear fission or nuclear fusion.

CHAPTER 11 EXPLORING FORCES

Lesson 1 Forces and Motion

Read a Graph: Distance and Time
72.7 meters (p. 357)

Read a Diagram: Net Force
less force (p. 365)

Quick Check

1. distance (p. 357)
2. a change in an object's position compared to an object that does not move (p. 357)
3. b (p. 359)
4. c (p. 359)
5. a (p. 359)
6. thrust (p. 361)
7. momentary force (p. 361)
8. force (p. 361)
9. continuous force (p. 361)
10. a spring scale (p. 363)
11. a force that works against the motion of an object (p. 363)
12. balanced forces (p. 365)
13. When a car stops suddenly, people without a seat belt or an air bag to stop their forward motion could get hurt. They could hit the window or the seat in front of them. (p. 367)

Lesson 2 Changes in Motion

Read a Diagram: Force, Mass, and Acceleration
less (p. 368)

Read a Diagram: Action-Reaction Forces

The part that shows the diver's body being pushed upward by the board shows a reaction force. (p. 370)

Quick Check

14. F (p. 369)

15. T (p. 369)

16. F (p. 369)

17. For every action force, there is an equal and opposite reaction force. (p. 371)

18. The force of gravity on the Moon is less than the force of gravity on Earth. (p. 371)

19. c (p. 373)

20. d (p. 373)

21. a (p. 373)

22. b (p. 373)

Lesson 3 Work and Energy

Read a Diagram: Force x Distance

$288 \text{ Nm} = 288 \text{ J}$ (p. 375)

Read a Photo: Examples of Energy Transformation

the car, the fan, and the radiometer (p. 379)

Quick Check

23. c (p. 375)

24. d (p. 375)

25. a (p. 375)

26. b (p. 375)

27. Potential energy is stored in an object. Kinetic energy is the energy of motion. (p. 377)

28. b (p. 379)

29. a (p. 379)

30. d (p. 379)

31. c (p. 379)

32. The elevator has more power. (p. 381)

33. Scientists measure power in joules per second (J/s), watts (W), or horsepower. (p. 381)

Lesson 4 How Machines Work

Read a Diagram: Kinds of Levers

at the wheel (p. 385)

Read a Diagram: Kinds of Pulleys

the movable pulley (p. 387)

Quick Check

34. d (p. 383)

35. c (p. 383)

36. a (p. 383)

37. b (p. 383)

38. second-class and third-class levers (p. 385)

39. the part between the elbow and wrist (forearm) (p. 385)

40. F (p. 387)

41. F (p. 387)
42. T (p. 387)
43. wedge (p. 389)
44. screw (p. 389)
45. inclined plane (p. 389)
46. two or more simple machines joined together (p. 391)
47. because friction wastes some of the input work as heat (p. 391)

Chapter 11: Vocabulary Review

Page 392

1. d
2. k
3. e
4. b
5. c
6. g
7. i
8. j
9. h
10. a
11. f

Page 393

1. friction
2. acceleration
3. screw
4. potential
5. speed
6. velocity
7. momentum

For every action force, there is an equal and opposite reaction force.

Summarize

Forces, such as friction, can affect an object by changing its speed, direction, or shape. Forces may be balanced or unbalanced. Newton's second law of motion states that the amount of net force and mass affect an object's acceleration. Newton's third law of motion states that for every action force there is an equal and opposite reaction force. An object's weight changes depending on gravitational pull, but its mass stays the same. Work is a force that moves an object a certain distance. Energy is the ability to do work. All energy is either potential or kinetic. Power is the amount of work done in a certain amount of time. Simple machines are tools with few or no moving parts that make work easier. Examples are the lever, wheel and axle, pulley, inclined plane, screw, and wedge. A compound machine is made of two or more simple machines.

CHAPTER 12 EXPLORING ENERGY

Lesson 1 Waves and Sound

Read a Diagram: Wave Motion
It moves up and down. (p. 399)

Read a Table: Speed of Sound
glass (p. 400)

Quick Check

1. compression (p. 397)
2. lowest (p. 397)
3. second (p. 399)
4. solids (p. 399)
5. b (p. 401)
6. a (p. 401)
7. T (p. 403)
8. F (p. 403)
9. harmony; rhythm (p. 405)

Lesson 2 Properties of Light

Read a Diagram: The Law of Reflection

Light is reflected from the same point at an equal angle. (p. 408)

Read a Diagram: The Human Eye

It bends light rays closer before they reach the eye. The rays are then focused on the retina. (p. 411)

Quick Check

10. F (p. 407)
11. T (p. 407)
12. T (p. 407)
13. mirror (p. 409)
14. law of reflection (p. 409)
15. b (p. 409)
16. a (p. 409)
17. c (p. 409)
18. convex (p. 410)
19. concave (p. 410)
20. concave lens, faraway objects are blurry, long eyes (p. 411)
21. convex lens, nearby objects are blurry, short eyes (p. 411)

Lesson 3 Light Waves and Color

Read a Diagram: The Electromagnetic Spectrum

infrared waves and ultraviolet rays (p. 414)

Read a Diagram: Color Models in the RGB model (p. 417)

Quick Check

22. T (p. 413)
23. F (p. 413)
24. T (p. 413)
25. d (p. 415)
26. a (p. 415)
27. b (p. 415)
28. c (p. 415)
29. primary (p. 416)
30. secondary (p. 416)

- 31. secondary (p. 416)
- 32. primary (p. 416)
- 33. primary (p. 416)
- 34. secondary (p. 416)
- 35. in a color printer (p. 417)

Lesson 4 Heat

Read a Diagram: Measuring Heat Flow

The temperature of the water in the beaker went down. The temperature of the water in the plastic bag went up. (p. 420)

Read a Diagram: Heating Systems

rise (p. 422)

Quick Check

- 36. heat (p. 418)
- 37. large mass, medium temperature (p. 419)
- 38. a mold filled with molten copper (p. 419)
- 39. 100 calories (p. 419)
- 40. convection (p. 421)
- 41. radiation (p. 421)
- 42. conduction (p. 421)
- 43. F (p. 423)
- 44. T (p. 423)
- 45. T (p. 423)
- 46. T (p. 423)
- 47. specific heat (p. 425)
- 48. joules (p. 425)
- 49. low (p. 425)
- 50. high (p. 425)

Lesson 5 Electricity and Magnetism

Read a Diagram: A Simple Circuit

The circuit is closed. The bulb is lit, so electricity is flowing. (p. 430)

Read a Diagram: From Generators to Homes

at substation transformers (p. 437)

Quick Check

- 51. electricity (p. 426)
- 52. T (p. 427)
- 53. T (p. 427)
- 54. c (p. 429)
- 55. b (p. 429)
- 56. a (p. 429)
- 57. direct (p. 431)
- 58. alternating (p. 431)
- 59. F (p. 433)
- 60. F (p. 433)
- 61. attracted (p. 434)

62. repelled (p. 434)
63. magnetic field (p. 435)
64. electromagnet (p. 435)
65. 3, 1, 2, 4 (p. 437)
66. F (p. 439)
67. T (p. 439)

Chapter 12: Vocabulary Review

Page 440

1. e
2. c
3. h
4. a
5. i
6. g
7. j
8. b
9. f
10. k
11. d

Page 441

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

Summarize

Waves use a medium to move sound energy from a source. Light travels from its source in straight lines. The lines move out in all directions. The electromagnetic spectrum contains visible light. Visible light can be separated into different colors. Heat energy flows from a warmer object to a cooler object until they are both the same temperature. Electricity is the movement and transfer of the energy of charged particles.