

# Numerical and Short Answers

This section includes numerical and short answers to questions in Check Your Learning, Chapter Review, Chapter Self-Quiz, Unit Review, and Unit Self-Quiz.

## Unit B

### Section 2.2, p. 35

- yes
- backyard pond, tree, schoolyard, potted plant

### Section 2.4, p. 41

- 0.023 %
- sugars
- plant growth and maintenance

### Section 2.5, p. 47

- first trophic level
- third and fourth trophic levels
- (b) rabbit, mouse, squirrel  
(c) grasses, berries, tree seeds

### Section 2.6, p. 51

- burning fossil fuels, deforestation
- burning fewer fossil fuels, planting more trees
- decomposition

### Section 2.7, p. 55

- (a) yes

### Section 2.8, p. 59

- deciduous forest
- climate

### Section 2.9, p. 62

- salt concentrations, nutrient levels, temperature, light

### Chapter 2 Review, pp. 68–69

- (a) lithosphere  
(b) cellular respiration; photosynthesis  
(c) hydrosphere  
(d) sustainable  
(e) carrying capacity  
(f) marine  
(g) ecosystem  
(h) hydrosphere; lithosphere; thermal  
(i) photosynthesis

- (c) photosynthesis and cellular respiration  
(d) cellular respiration  
(e) only for photosynthesis  
(f) only during cellular respiration  
(g) only for photosynthesis  
(h) only for photosynthesis

- (a) (iii)  
(b) (iv)  
(c) (i)  
(d) (v)  
(e) (ii)
- the Sun
- the Sun
- dolphin, seal, small fish

### Chapter 2 Self-Quiz, pp. 70–71

- (b)
- (a)
- (b)
- (c)
- (c)
- (a)
- F
- F
- T
- photosynthesis
- oxygen
- species
- (a) (ii)  
(b) (iii)  
(c) (iv)  
(d) (i)
- oxygen
- (a) increase  
(b) increase
- (a) vegetation, animals  
(b) temperature, amount of rainfall
- (a) e.g., bees and flowering plants  
(b) e.g., nesting birds and trees

### Section 3.2, p. 82

- secondary

### Section 3.3, p. 86

- (a) habitat destruction, overexploitation
- extirpated, endangered, threatened, special concern

### Section 3.4, p. 90

- Africa, Latin America, the Caribbean

### Section 3.5, p. 94

- no
- chemical, mechanical, and biological control

### Section 3.6, p. 101

- human population increase, modern industry
- sulfur dioxide and nitrogen oxide
- limestone
- skimming, burning, detergents, bioremediation

### Section 3.7, p. 105

- wood, wildlife
- clear-cutting, shelterwood cutting, selective cutting
- clear-cutting

### Chapter 3 Review, pp. 110–111

- (a) services  
(b) secondary  
(c) rainforests  
(d) risk  
(e) habitat fragmentation  
(f) habitat  
(g) invasive
- (a) (iii)  
(b) (iv)  
(c) (ii)  
(d) (v)  
(e) (i)
- (a) tropical rainforest  
(b) near the equator
- skimming, burning, detergents, bioremediation

6. (a) cultural service  
(b) product  
(c) other service  
(d) product  
(e) cultural service  
(f) other service  
(g) product
7. (a) (v)  
(b) (iv)  
(c) (i)  
(d) (ii)  
(e) (iii)
12. biological, mechanical, and chemical control

### Chapter 3 Self-Quiz, pp. 112–113

1. (b)
2. (a)
3. (c)
4. (b)
5. primary
6. acid precipitation
7. equilibrium
8. F
9. F
10. F
11. (a) (iv)  
(b) (i)  
(c) (v)  
(d) (ii)  
(e) (iii)
19. yes

### Section 4.1, p. 122

5. no
7. no

### Section 4.2, p. 128

8. crop rotation, crop selection, no-till farming

### Section 4.4, p. 134

1. lack of biodiversity
2. a species that reduces crop yield
3. herbicides, insecticides, rodenticides, fungicides, molluscicides

### Section 4.5, p. 140

1. less crop damage, greater crop yield, insect population control

### Chapter 4 Review, pp. 150–151

1. (a) pest  
(b) natural  
(c) pesticides  
(d) bioaccumulate  
(e) narrow-spectrum  
(f) integrated pest management  
(g) monoculture  
(h) engineered
2. (a) natural  
(b) monoculture  
(c) monoculture  
(d) monoculture  
(e) monoculture  
(f) monoculture
4. (a) (v)  
(b) (iv)  
(c) (iii)  
(d) (i)  
(e) (ii)
7. tools, concentrated energy sources
8. engineered
15. to reduce soil compaction and erosion

### Chapter 4 Self-Quiz, pp. 152–153

1. (c)
2. (a)
3. (b)
4. (d)
5. F
6. T
7. engineered
8. monoculture
9. leaching
10. organic farming
11. (a) (iii)  
(b) (i)  
(c) (ii)  
(d) (iv)
18. natural forest
27. nitrogen, phosphorus, potassium
30. (a) allow nutrients, water, and oxygen to reach roots

### Unit B Review, pp. 158–163

1. (b)
2. (d)
3. (b)
4. (d)
5. (d)

6. (c)
7. (c)
8. (c)
9. (b)
10. (d)
11. (c)
12. (d)
13. (c)
14. (b)
15. (d)
16. (b)
17. T
18. T
19. F
20. T
21. F
22. T
23. F
24. F
25. F
26. T
27. F
28. T
29. tolerance range
30. carrying capacity
31. marine
32. clearing and burning
33. estuary
34. biological control
35. sulfur dioxide; nitrogen
36. selective cutting
37. thermal
38. nitrogen; phosphorus; potassium
39. tundra
40. ecological footprint
41. (a) (iv)  
(b) (ii)  
(c) (i)  
(d) (v)  
(e) (iii)
42. the Sun
57. (a) increase
64. (b) yes
66. (a) just after the red crab migration
67. (a) an inverse relationship  
(b) after
68. (b) grasses

## Unit B Self-Quiz, pp. 164–165

- (b)
- (c)
- (b)
- (d)
- F
- F
- T
- leaching
- ecosystem
- (a) (v)  
(b) (ii)  
(c) (iv)  
(d) (vi)  
(e) (iii)  
(f) (i)
- (a) soil compaction
- (a) temperate deciduous forest  
(b) tundra

## Unit C

### Section 5.1, p. 178

- (a) solution  
(b) mechanical mixture  
(c) solution  
(d) mechanical mixture  
(d) mechanical mixture
- lead poisoning

### Section 5.2, p. 182

- (a) qualitative  
(b) quantitative  
(c) qualitative  
(d) quantitative

### Section 5.3, p. 186

- (a) physical  
(b) physical  
(c) chemical  
(d) chemical
- (a) physical  
(b) physical  
(c) chemical  
(d) physical  
(e) chemical
- emission of light

### Section 5.6, p. 198

- liquid at room temperature, conducts electricity
- sink

- 0.48 cm<sup>3</sup>
- 8.96 g/cm<sup>3</sup>, copper
- 33.6 g
- 2.70 g/cm<sup>3</sup>, aluminum
- 0.63 cm<sup>3</sup>
- 11.36 g/cm<sup>3</sup>, lead
- 14 252.77 g

### Chapter 5 Review, pp. 202–203

- boiling point, melting point, density
- Workplace Hazardous Materials Information System
- (a) qualitative  
(b) quantitative  
(c) qualitative  
(d) quantitative  
(e) qualitative
- (a) physical  
(b) physical  
(c) physical  
(d) chemical  
(e) physical  
(f) chemical  
(g) chemical
- chemical
- physical
- 69 g
- 6.86 kg/L or 6.86 g/cm<sup>3</sup>
- 0.75 g/mL or 0.75 g/cm<sup>3</sup>; yes
- 187 cm<sup>3</sup>

### Chapter 5 Self-Quiz, pp. 204–205

- (b)
- (d)
- (a)
- (c)
- F
- T
- faster
- physical
- (a) (iv)  
(b) (i)  
(c) (ii)  
(d) (iii)  
(e) (v)
- colour and odour change
- 5 g of liquid gold
- 2.70 g/cm<sup>3</sup>

- 2.52 g
- no
- float
- (a) physical  
(b) chemical  
(c) chemical  
(d) physical  
(e) physical

### Section 6.1, p. 215

- (b) tin  
(c) chromium  
(f) arsenic  
(g) nickel
- no
- metallic
- high lustre, good conductivity, malleable, ductile
- low lustre, poor conductivity, brittle
- (a) metals  
(b) non-metals  
(c) metals  
(d) non-metals  
(e) non-metals  
(f) non-metals  
(g) metals  
(h) metals
- (a) good conductors of thermal energy  
(b) malleable, lustrous, do not corrode  
(c) poor conductor of thermal energy
- (b) thermal and electrical conductivity

### Section 6.4, p. 225

- (a) incorrect  
(b) incorrect  
(c) correct  
(d) correct
- (a) halogens  
(b) alkaline earth metals  
(c) alkali metals  
(d) noble gases
- (a) all but one of the names end in “-ium”  
(b) hydrogen
- highly reactive, too soft
- Group 17, halogens

**Section 6.6, p. 233**

- (b) electrons
  - embedded in the atom
  - atoms are neutral
  - surrounding the electrons
- 3
- (c) protons and electrons
  - protons in nucleus, electrons surround nucleus

**Section 6.7, p. 240**

- yes
- no
- (a) correct
  - incorrect
  - correct
  - incorrect
  - correct
  - correct
- 30
- 2, 8, 8
- (a) F
  - T
  - T
  - T

**Section 6.8, p. 244**

- (a) graphite
  - diamond
  - charcoal

**Chapter 6 Review, pp. 248–249**

- (a) halogens
  - alkaline earth metals
  - alkali metals
  - noble gases
- divides metals from non-metals
- Dmitri Mendeleev
- (a) 2, 8, 8
  - 18
- (a) C; B
  - B; C

**Chapter 6 Self-Quiz, pp. 250–251**

- (a)
- (d)
- (b)
- (c)
- F
- T
- metals, non-metals

- halogens
- isotopes
- (a) (v)
  - (i)
  - (ii)
  - (iii)
  - (iv)
- (a) negative
  - no
- fluorine
- (a) 78
  - platinum
- 3
- (a) they would conduct thermal energy
  - non-conducting material, e.g. plastic
- 0
- less reactive, more stable

**Section 7.1, p. 261**

- (a) 4
  - 1 Na atom, 1 H atom, 1 C atom, 3 O atoms
  - yes
- (a) H<sub>2</sub>, S<sub>8</sub>, Ne
  - CO<sub>2</sub>, C<sub>3</sub>H<sub>8</sub>
  - Ne
  - H<sub>2</sub>, CO<sub>2</sub>, S<sub>8</sub>, C<sub>3</sub>H<sub>8</sub>
- H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub>, I<sub>2</sub>
- they contain only hydrogen and carbon
- (a) NH<sub>3</sub>
  - CO<sub>2</sub>
  - CO
  - H<sub>2</sub>O
  - C<sub>3</sub>H<sub>8</sub>O
- ion with +2 electrical charge
- Ca<sup>2+</sup>
- (a) molecular element
  - ionic compound
  - molecular compound
  - molecular compound

**Section 7.3, p. 266**

- (a) 58 %
  - no
- (a) lye or caustic soda
  - ozone
  - table salt
  - as a solid, dry ice; as a gas, carbon dioxide
  - baking soda

- as a mineral, limestone or marble
- (a) hydrochloric acid
  - acetic acid
  - potassium carbonate
  - calcium oxide
  - magnesium hydroxide
  - methane
- (c) yes
- non-metallic atoms

**Section 7.6, p. 273**

- bleaches colour
- oxygen produced kills bacteria
- to prevent breakdown into water and oxygen

**Chapter 7 Review, pp. 280–281**

- (b) H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub>, Cl<sub>2</sub>, Br<sub>2</sub>, I<sub>2</sub>
- (a) ionic
  - ionic
  - molecular
- (a) CO<sub>2</sub>
  - H<sub>2</sub>
  - O<sub>2</sub>
- non-metallic elements
- metallic elements and non-metallic elements
- FeO and Fe<sub>2</sub>O<sub>3</sub>
- compound; production of gas
- 2 H<sub>2</sub>O, 1 CO<sub>2</sub>

**Chapter 7 Self-Quiz, pp. 282–283**

- (d)
- (a)
- (c)
- (a)
- (b)
- F
- F
- T
- hydrocarbons
- covalent
- cation
- (a) (v)
  - (i)
  - (ii)
  - (iii)
  - (iv)
- full outer electron orbits

15. (a) one electron transferred from K to Cl  
 (b) 18  
 (c) 18
17. (a) burning splint test
18. (a) both react with oxygen

### Unit C Review, pp. 288–293

1. (c)  
 2. (a)  
 3. (b)  
 4. (c)  
 5. (c)  
 6. (c)  
 7. (b)  
 8. (b)  
 9. (d)  
 10. (d)  
 11. (c)  
 12. (d)  
 13. T  
 14. F  
 15. F  
 16. F  
 17. T  
 18. F  
 19. T  
 20. F  
 21. F  
 22. F  
 23. T  
 24. T  
 25. T  
 26. mass  
 27. density  
 28. Workplace Hazardous Materials Information System  
 29. wafting  
 30. physical  
 31. chemical  
 32. oxygen  
 33. vinegar  
 34. table salt  
 35. J.J. Thomson  
 36. sulfur  
 37. decomposition  
 38. hydrogen  
 39. limewater

40. (a) (iv)  
 (b) (vii)  
 (c) (i)  
 (d) (viii)  
 (e) (ii)  
 (f) (iii)  
 (g) (v)  
 (h) (vi)
41. (a) (iii)  
 (b) (iv)  
 (c) (i)  
 (d) (ii)
42. (a) (ii)  
 (b) (iii)  
 (c) (iv)  
 (d) (v)  
 (e) (i)
44. (a) physical  
 (b) physical  
 (c) chemical  
 (d) physical  
 (e) chemical  
 (f) physical  
 (g) physical
54. mass number
59. metals
65. low or no reactivity
66. (a) the same
72. (a) ductility
74. (a) B  
 (b) A
75. (a) burning splint test  
 (b) there are no carbon atoms
76. eagles

### Unit C Self-Quiz, pp. 294–295

1. (c)  
 2. (b)  
 3. (a)  
 4. (b)  
 5. F  
 6. T  
 7. F  
 8. cations  
 9. qualitative; quantitative
10. (a) (iii)  
 (b) (ii)  
 (c) (i)  
 (d) (iv)

11. (a) physical  
 (b) chemical  
 (c) chemical  
 (d) physical  
 (e) physical
13. (a) agree  
 (b) agree  
 (c) disagree
16. (a)  $\text{CaCl}_2$   
 (b)  $\text{N}_2\text{O}_4$   
 (c)  $\text{Na}_2\text{S}_2$
20. physical
23. (a)  $d = 19.33 \text{ g/cm}^3$ , gold  
 (b)  $d = 5.02 \text{ g/cm}^3$ , pyrite

## Unit D

### Section 8.1, p. 308

1. celestial objects  
 3. it reflects sunlight  
 8. Milky Way galaxy  
 9. Universe, galaxy, star, planet, moon

### Section 8.2, p. 312

4. 2 000 000–15 000 000 °C  
 5. approximately 25 days  
 6. Galileo Galilei  
 8. North and South poles

### Section 8.3, p. 317

3. (b) 150 000 000 km  
 4. dwarf planet  
 5. (a) meteor  
 (b) meteorite  
 (c) meteoroid
8. (a) 2061  
 (b) 4377

### Section 8.5, p. 328

1. gas giants  
 5. (a) gravity  
 (b) objects fall to the ground  
 (c) Sir Isaac Newton
6. above the North Pole; Polaris
9. (a) around June 21 and December 21
10. (a) summer  
 (b) fall  
 (c) winter  
 (d) spring

11. (a) (iv)  
(b) (iii)  
(c) (i)  
(d) (ii)
12. 8
13. solar, lunar
14. alignment of the Sun, the Moon, and Earth; no

### Section 8.6, p. 333

2. yes; the shape will change
4. North Star or Polaris

### Section 8.9, p. 343

1. the Moon, Polaris, comets
3. ecliptic
6. retrograde motion
7. they have a slower orbit than Earth
9.  $180^\circ$
10.  $90^\circ$
12.  $4^\circ$
13. 3

### Section 8.11, p. 351

3. (a) 1957; Soviet Union  
(b) 1962; Alouette 1
9. Global Positioning System

### Chapter 8 Review, pp. 356–357

2. (a) chromosphere  
(b) photosphere  
(c) core  
(d) corona  
(e) convective zone  
(f) radiative zone  
(g) solar prominence  
(h) solar flare
3. from east to west, along ecliptic
8. small, rocky celestial object; in orbit between Mars and Jupiter
9. large chunk of ice, rock, and dust; beyond orbit of Neptune
10. apparent backward motion of a planet
11. gravitational force
23. 35 790 km
24. altitude, azimuth; date, time, location
25. Polaris
30. equator

### Chapter 8 Self-Quiz, pp. 358–359

1. (d)
2. (d)
3. (a)
4. (b)
5. T
6. F
7. Sun
8. summer
9. luminous
10. (a)(v)  
(b) (i)  
(c) (ii)  
(d) (iv)  
(e) (iii)
12. (a) 30.0 AU  
(b) 108 000 000 km
19. yes
23. no

### Section 9.1, p. 369

2.  $5.7 \times 10^{15}$  km
3. 430 ly
5. star positions, parallaxes, and motions
6.  $1.3 \times 10^{26}$  m
7. 61.2 AU
10. 30 cm
11. (a) AU  
(b) m or km  
(c) ly or AU  
(d) ly  
(e) m or km

### Section 9.2, p. 373

2. the total amount of energy produced per second
4. Hipparchus; 2100 years ago
6. 33 ly from Earth; yes
7.  $3100^\circ\text{C}$ , red;  $4800^\circ\text{C}$ , orange;  $8000^\circ\text{C}$ , yellow;  $10\,200^\circ\text{C}$ , blue

### Section 9.4, p. 382

1. 15 million  $^\circ\text{C}$  ( $1.5 \times 10^7$   $^\circ\text{C}$ )
4. (b) no
7. (a) solar mass

### Section 9.5, p. 384

5. hydrogen, helium
6. a shockwave from a nearby supernova; contraction

### Section 9.6, p. 391

4. (a) 1935, 2005
8. Local Group, 35 galaxies
9. Virgo Supercluster, thousands of galaxies

### Section 9.7, p. 397

4. the Universe's rate of expansion is increasing
5. 13.6–13.8 billion years ago; Georges Lemaître
6. no
8. COBE and WMAP; temperature variations

### Chapter 9 Review, pp. 400–401

1. a massive cloud of interstellar gases and dust
3. elliptical, spiral, lenticular, and irregular
4. distance from Earth, size
7. above and below the disc of the Milky Way
8. a huge, energy-rich galaxy with a black hole in its centre
12. nebula, protostar, nuclear fusion, supernova, neutron star
14.  $5.9 \times 10^{15}$  km
21. red giant, orange main sequence star, yellow main sequence star, white dwarf, blue supergiant
22.  $1.1 \times 10^{23}$  km
23. radiation
24.  $25\,000^\circ\text{C}$
25. +5
26. Virgo Supercluster, spiral galaxy, nebula, red supergiant, white dwarf, neutron star
27. spiral
32. it is moving toward Earth

**Chapter 9 Self-Quiz,  
pp. 402–403**

- (d)
- (b)
- (a)
- (d)
- F
- T
- T
- parallax
- luminosity
- neutron stars
- (a) (iv)  
(b) (ii)  
(c) (i)  
(d) (iii)
- apparent magnitude scale
- $3.78 \times 10^{15}$  km
- black hole or neutron star
- (a) red shift
- 10 Lacertra, Canopus, Aldebaran, Antares
- (a) light years  
(b) AU  
(c) kilometres
- (b) galaxy is moving toward Earth

**Section 10.1, p. 418**

- radio waves, X-rays, gamma rays, ultraviolet and infrared rays
- over 16

**Section 10.2, p. 425**

- small robotic probes

**Section 10.3, p. 430**

- barcode scanning
- coastlines, glaciers, oceans, land, freshwater resources
- ozone layer

**Section 10.5, p. 437**

- it has similar characteristics
- 4 days vs. 6–10 months
- Dennis Tito, \$30 million
- counterweight, tether, climber

**Chapter 10 Review, pp. 440–441**

- Galileo Galilei, 1609
- Global Positioning System
- Ares V* and *Ares I*
- bone density
- microgravity environment
- (a) (iv)  
(b) (ii)  
(c) (i)  
(d) (iii)

**Chapter 10 Self-Quiz,  
pp. 442–443**

- (c)
- (a)
- (c)
- F
- T
- F
- microgravity
- reflecting
- spacecraft
- (a) (i)  
(b) (iv)  
(c) (ii)  
(d) (iii)
- it has similar characteristics
- they are in free fall
- using resistance devices, running on treadmill

**Unit D Review, pp. 448–453**

- (d)
- (a)
- (b)
- (a)
- (b)
- (d)
- (a)
- (b)
- (a)
- (b)
- F
- F
- F
- T
- F
- F
- T
- T
- T

- F
- F
- T
- F
- F
- reflecting
- new moon
- Polaris
- gravity
- Moon; Sun
- Earth
- sunspots
- the Sun; Earth
- osteoporosis
- Galileo
- galaxy
- apparent magnitude
- (a) (ii)  
(b) (i)  
(c) (iii)  
(d) (v)  
(e) (iv)
- no
- (b) rotation  
(c) revolution
- (a)  $2.25 \times 10^9$  km  
(b) 15 AU
- $1.51 \times 10^{16}$  km
- no
- (b) toward the trees
- (a) geostationary  
(b) decrease its altitude
- (b) irregular  
(c) 3000–4000 °C; end of their life  
(d)  $1.2 \times 10^{23}$  m
- (b) auroras would be visible
- (a) it is larger than Earth's  
(b) asteroid

**Unit D Self-Quiz, pp. 454–455**

- (c)
- (c)
- (b)
- (b)
- (c)
- (d)
- F
- F
- F
- F



10. astronomical unit or AU
11. geocentric
12. asteroids
13. (a) (iii)  
(b) (iv)  
(c) (i)  
(d) (ii)
14. distance light travels in a vacuum in 1 year
16. 35 min
21. (a) Earth is between the Sun and the Moon

## Unit E

### Section 11.1, p. 471

3. (a) protons, neutrons  
(b) electrons
4. (a) neutral  
(b) negative
5. add 2 electrons
6. remove 1 or more electrons;  
add 1 or more electrons
7. (a) attract  
(b) repel

### Section 11.2, p. 477

5. (a) electrons  
(b) from "Y" to "X"

### Section 11.4, p. 482

3. no
6. rubber is an insulator
7. golfer

### Section 11.6, p. 489

6. (a) attract

### Chapter 11 Review, pp. 498–499

6. (a) overall positive charge  
(b) overall negative charge
10. no
13. no
18. induced charge separation
22. it is negatively charged

### Chapter 11 Self-Quiz, pp. 500–501

1. (c)
2. (d)
3. (a)
4. (b)

5. (c)
6. T
7. F
8. F
9. electrons
10. grounding
11. ions
12. (a) (iii)  
(b) (iv)  
(c) (i)  
(d) (v)  
(e) (ii)
14. they are insulators
15. (a) highest part of barn
17. (a) the leaves will spread apart  
(b) the leaves will fall

### Section 12.1, p. 508

4. source of electrical energy

### Section 12.2, p. 510

4. switch
6. light, motor

### Section 12.3, p. 514

4. primary cell
8. no

### Section 12.4, p. 517

4. (a) AC  
(b) DC  
(c) DC  
(d) AC

### Section 12.7, p. 535

4. price, cost of operating
5. 32 %
6. (a) \$12.00  
(b) \$1.56  
(c) \$28.80  
(d) \$788.40
7. 51.7 ¢

### Chapter 12 Review, pp. 542–543

1. no
2. renewable, non-polluting
5. it uses 60 J/s
11. 69 %
12. (a) \$604.62

### Chapter 12 Self-Quiz, pp. 544–545

1. (b)
2. (a)
3. (b)
4. (b)
5. T
6. F
7. chemical; electrical
8. fossil fuels
9. (a) (ii)  
(b) (v)  
(c) (iii)  
(d) (i)  
(e) (iv)
10. (a) 1000 or  $10^3$   
(b) 1 000 000 or  $10^6$   
(c) 1 000 000 000 or  $10^9$
13. (a) 1406 J  
(b) less
14. 3 hours
17. no

### Section 13.1, p. 554

1. (a) 1  
(b) 4
2. (a) parallel  
(b) series

### Section 13.3, p. 557

3. no

### Section 13.5, p. 561

4. no

### Section 13.7, p. 566

3. plastic
6. (a) increase  
(b) decrease  
(c) increase  
(d) decrease

### Section 13.9, p. 570

2. (b)
3. approximately 1200  $\Omega$
5. 18  $\Omega$
6. 4.75 A
7. 120 V
8. 0.024  $\Omega$



**Section 13.10, p. 575**

4. (a) decrease  
(b) decrease
5. (a) 0.24 A  
(b) 3 V
6. (a) 3 A  
(b) 120 V
7. (a) 69.3 V  
(b) 13.86 V

**Chapter 13 Review, pp. 580–581**

2. (a) series  
(b) parallel
7. its temperature will increase
8. in parallel; off
9. (a)
13. yes
16. no
17. dry
19. parallel
23. 24  $\Omega$
24. 0.48 A
25. 0.42 V
26. 40  $\Omega$

**Chapter 13 Self-Quiz, pp. 582–583**

1. (c)
2. (a)
3. (b)
4. F
5. T
6. F
7. resistance
8. current
9. circuit diagram
10. (a) (iv)  
(b) (ii)  
(c) (iii)  
(d) (i)
15. (a) 6 V  
(b) 0.75 A
16. 175 V
21. (a) all lights would go out
22. both would decrease

**Unit E Review, pp. 588–593**

1. (c)
2. (a)
3. (b)
4. (d)
5. (d)
6. (b)
7. (c)
8. (b)
9. (a)
10. (d)
11. (d)
12. (d)
13. (a)
14. (b)
15. (a)
16. (c)
17. (a)
18. (b)
19. T
20. F
21. F
22. F
23. F
24. T
25. F
26. F
27. F
28. T
29. F
30. F
31. T
32. F
33. T
34. F
35. T
36. F
37. F
38. F
39. electric discharge
40. ammeter
41. direct current
42. gaining
43. does not
44. ground; grounding
45. contact
46. atoms
47. Sun

48. parallel; series
49. potential difference; parallel
50. slope
51. equal
52. equal
53. release or emission
54. (a) (i)  
(b) (iii)  
(c) (v)  
(d) (ii)  
(e) (iv)
67. (a) negative  
(b) neutral
68. (a)  $V_{\text{load}} = 2.0 \text{ V}$ ,  $I_{\text{load}} = 1.0 \text{ A}$   
(b)  $V_{\text{load}} = 6.0 \text{ V}$ ,  $I_{\text{load}} = 0.33 \text{ A}$
69. (a)  $R_{\text{load}} = 2.0 \Omega$ ,  $R_{\text{total}} = 6.0 \Omega$   
(b)  $R_{\text{load}} = 18.0 \Omega$ ,  $R_{\text{total}} = 6.0 \Omega$
70. approximately 65  $\Omega$
71. 9.58  $\Omega$
72. 0.072 A or 72 mA
73. 1.5 V
75. (b) 108 kW·h/month
82. current electricity

**Unit E Self-Quiz, pp. 594–595**

1. (b)
2. (d)
3. (a)
4. (a)
5. T
6. F
7. T
8. attract
9. insulators
10. secondary cells; primary cells
11. (a) (iv)  
(b) (ii)  
(c) (i)  
(d) (v)  
(e) (iii)
16. (b) polyester
19. B

**Appendix A****Section 5.A, p. 624**

- (a) 3500 ms
- (b) 5200 mA
- (c) 7500 ng