Answer key

1 Ecotourism: Another way to see the world

1·1 *Suggested answers:* destination, travel agency, ship, airplane, online booking service, adventures, sightseers, globetrotters, tourist, commercial tour operators, hotels, palm-lined beaches, travel, souvenirs, tour guides, resort, parks, traveler

1·2 *Consult a dictionary for definitions.*

1. accommodation, accommodating
2. conversion, convertible
3. disposal, disposable
4. enforcement, enforceable
5. integration, integral
6. initiation, initial
7. minimum, minimal
8. beneficial, benefit
9. diverse, diversify
10. exploitative/exploitable, exploit
11. commitment, commit
12. sustainability, sustain
13. implementation
14. projection
15. convention
16. impact
17. environmental
18. resourceful
19. —
20. —

1·3

1. integrate
2. committed
3. convert
4. implement
5. conventional
6. enforce
7. accommodate
8. minimize
9. impact
10. projects
11. initiate
12. benefit
13. diversification, revenue
14. commodity
15. sustainable
16. resource
17. environment
18. dispose of
19. exploitation

1·4

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

1·5 *Suggested answers:*

Paragraph 2: Tourism will continue to grow at a rapid rate.
Paragraph 3: Tourism has become a major economic factor.
Paragraph 4: Tourism is a serious threat to the environment.
Paragraphs 5 and 6: Ecotourism has developed as a popular alternative over the last two decades.
Paragraph 7: Ecotourism aims to protect the environment, conserve resources, use alternative energy, support local economies, and preserve cultural traditions.
Paragraphs 8 and 9: Many successful examples of ecotourism exist in Madagascar, the Philippines, Nepal, and Costa Rica.
Paragraph 10: The increased demand for ecotourism can lead to further destruction of the environment and a greenwashing of tourist operations.
Paragraph 11: The success of ecotourism depends on the commitment of governments, the tourism industry, and the individual traveler to the environment.

1·6

1. a
2. c
3. c
4. b
5. c
6. a
7. T
8. T
9. F
10. T
11. F
12. F
13. Villages are turned into sprawling tourist playgrounds, hotels line beaches, fields are converted into golf courses, beaches become dirty, traffic is noisy, road construction increases, forest lands are cleared, ecosystems are destroyed, wildlife is endangered, and people are displaced.
14. Some countries depend heavily on the revenue, foreign investment, employment, and development.
15. Sí Como No runs on solar power, recycles, conserves water, and practices environmental gray water management. Its staff is trained in environmental awareness, and time and money are invested in programs that benefit the environment and the community.
16. Ecotourism is meant to protect the environment and support local communities and culture, while sustainable tourism is meant to provide for future generations and does not specifically focus on the environment.
17. Hotels under the IHEI have joined with the United Nations Environment Program and the International Hotel & Restaurant Association to develop a program to conserve energy and water, reduce waste and emissions, and promote environmental management.

1·7

1. 4,000 percent
2. heavily
3. major
4. many

1·8

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

1·9

1. ✓
2. X
3. ✓
4. ✓
5. X
6. ✓
7. ✓
8. X
9. ✓
10. ✓

1·10 *Answers will vary.*

2 The Human Genome Project: Writing the book of life

Questionnaire

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

2·1 *Suggested answers:* DNA, chromosome, gene, trait, splice, split, genome, parent, offspring, double helix, recombinant RNA

2·2 *Consult a dictionary for definitions.*

1. allocation
2. denial
3. discrimination, discriminatory
4. emergence, emergent
5. interpretation, interpretive
6. revelation, revealing
7. revolution, revolutionary
8. specification, specific
9. transmission, transmissible
10. undertaking
11. elimination
12. enhancement
13. estimation
14. empiricism
15. ethics
16. fundament
17. potential
18. evident
19. —
20. —

2·3

1. widespread
2. ethical
3. empirical
4. potential
5. eliminate
6. evidence
7. undertook
8. definitive
9. transmitted
10. fundamental

2·4

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

2·5

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

2·6

Paragraph 2: e
Paragraph 3: n
Paragraph 4: c
Paragraph 5: g
Paragraph 6: j
Paragraph 7: b
Paragraph 8: i
Paragraph 9: l
Paragraph 10: f
Paragraph 11: a
Paragraph 12: m
Paragraph 13: d
Paragraph 14: k

2·7

1. c
2. a
3. a
4. c
5. b
6. b
7. T
8. T
9. F
10. F
11. T
12. F
13. The main goals of the Human Genome Project were to lead to the understanding of genetic diseases, to create effective pharmaceuticals and medical treatments, and to prevent human suffering due to genetically transmitted diseases.
14. Mendel's experiments established that traits were passed from parents to offspring in an organized and predictable way; Charles Darwin developed the theory of evolution.
15. The Human Genome Project was made possible by recombinant DNA, the PCR machine, computer technology, and the Internet.
16. The Genetic Information Nondiscrimination Act made discrimination on the basis of genetic information illegal for employers, insurers, courts, schools, and other entities.

2·8

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

2·9

Suggested answers:

Paragraph 5

Main idea: Rapid technological advances allow researchers to process and store greater amounts of genetic information.

Supporting details:

1. Recombinant DNA and PCR machines allowed researchers to slice and copy DNA
2. The silicon semiconductor chip made analyzing and storing data faster and cheaper

Paragraph 9

Main idea: HGP promises to revolutionize how doctors test and treat patients and diagnose disease.

Supporting details:

1. More sophisticated diagnostic tests for genetic profiles and patient counseling
2. Computerized and portable patient files

Paragraph 10

Main idea: HGP promises revolutionary new drugs and reduced health care costs.

Supporting details:

1. Development of thousands of customized drugs with fewer side effects and successful results
2. Potential for cloned transplant organs and lifesaving advances

2·10

Suggested answers:

1. +
2. −
3. +
4. −
5. −
6. −
7. +
8. +

2·11

Answers will vary.

3 Near-death experiences: Fact or fantasy?

3·1 *Suggested answers:* die, heaven, hell, nirvana, paradise, resurrections, ghosts, dead, pronounce dead, suicide, the other side, the afterlife, kill, clinically dead, cardiac arrest, consciousness, close brush with death

3·2

1. cessation, ceaseless
2. conclusion, conclusive
3. document/documentation, documentary
4. establishment, established
5. evolution, evolutionary
6. survival/survivor, survivable
7. transportation/transport, transportable
8. concept, conceptual, conceive
9. validation, valid, validate
10. (ir)reversibility, reverse
11. alteration
12. compilation
13. encounter
14. trigger
15. aware
16. elemental
17. incidental
18. insightful
19. phenomenal
20. researcher, research

3·3

1. awareness
2. conclude
3. triggered
4. altered
5. insight
6. documented
7. encountered
8. compiled
9. research
10. phenomenon

3·4

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

3·5 *Consult a dictionary for definitions.*

1. n.
2. v.
3. adj.
4. v.
5. n.
6. adj.
7. v.
8. v.
9. n.
10. v.

3·6

1. are not
2. have been
3. nearly die
4. a very similar pattern, regardless of
5. scientific research
6. pleasant
7. does not have to
8. have not successfully proven
9. positive
10. can

3·7

1. b
2. c
3. c
4. a
5. b
6. F
7. T
8. T
9. F
10. T
11. F
12. *Near-death experience* means what people who are seriously ill or injured consciously experience when they seem to die but come back to life.
13. They are afraid that their doctor will not believe them.
14. The International Association for Near-Death Studies and the Near Death Experience Research Foundation were established to carry out NDE research.
15. The person feels himself leaving his body.
16. A person is pronounced "clinically dead" when the heart has stopped long enough for brain activity to cease and the person has lost consciousness.
17. A "life review" occurs when a person sees her life pass before her eyes, as if she is watching a movie.

3·8

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

3·9

1. X
2. ✓
3. ✓
4. X
5. ✓
6. X
7. X
8. ✓
9. ✓
10. X

3·10 *Answers will vary.*

4 Genetically modified organisms: Breadbasket or Pandora's box?

4·1 *Suggested answers:* farmers, seed, livestock, crop, yield, garden peas, breeding, cross-fertilization, wheat hybrids, grain, agronomist, varieties, cereal grains, irrigation, farm machinery, fertilizers, pesticides, fields, corn, soybeans, canola, cotton, potatoes, squash, tomatoes, dairy cows, weeds, plants, pest, farming methods, planting season, organic farming, soil

4·2 *Consult a dictionary for definitions.*

1. adj.
2. n.
3. v.
4. adj.
5. v.
6. n.
7. adj.
8. adj.
9. v.
10. v.
11. v.
12. n.
13. v.
14. n.
15. v.
16. n.
17. v.
18. adj.
19. adj.
20. v.

4·3

1. controversial
2. ensure
3. complexity
4. insert
5. precision
6. adequate
7. significant
8. so-called
9. conducting
10. finite

4·4

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

4·5

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

4·6

Paragraph 2: f
Paragraph 3: l
Paragraph 4: k
Paragraph 5: c
Paragraph 6: g
Paragraph 7: e
Paragraph 8: a
Paragraph 9: b
Paragraph 10: j
Paragraph 11: i
Paragraph 12: d
Paragraph 13: h

4·7

1. b
2. a
3. c
4. b
5. b
6. a
7. T
8. F
9. T
10. T
11. F
12. F
13. Terminator crops are sterile and cannot produce seed.
14. GE crops and foods have not been proven safe and are harmful to the environment.
15. GE crops mature earlier, contain more nutrients, resist pesticides and herbicides, and produce higher yields.
16. Most of the studies are conducted by the companies that produce GE seeds and products.
17. Organic farming increases yields, improves soil quality, reduces pests and disease, restores traditional breeds, and produces better-tasting, more nutritious food.

4·8

1. ✓
2. ✓
3. X
4. ✓
5. X
6. X

4·9

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

4·10

1. a. ✓ b. X
2. a. ✓ b. X
3. a. X b. ✓
4. a. X b. ✓
5. a. ✓ b. X
6. a. X b. ✓

4·11 *Answers will vary.*

4·12 *Answers will vary.*

5 Men and women: Long live the difference

Questionnaire

1. Men
2. Women
3. Men
4. Men
5. Women
6. Men
7. Women
8. Women
9. Women
10. Men

5·1 *Suggested answers:* lovers, sexes, female, male, feminine, masculine, hormones, sexual development, ovaries, testes, estrogen, progesterone, testosterone, oxytocin, mother, father, caregiver, feminism, battle of the sexes, Mr., Mrs.

5·2 *Consult a dictionary for definitions.*

1. n.
2. v.
3. v.
4. v.
5. v.
6. v.
7. n.
8. v.
9. adj.
10. v.
11. n.
12. n.
13. v.
14. adj.
15. v.
16. adj.
17. v.
18. n.
19. v.
20. n.

5·3

1. process
2. metaphors
3. function
4. primary
5. Intrinsic
6. matured
7. gender
8. theme
9. role
10. passive

5·4

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

5·5

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

5·6

1. ✓
2. X
3. ✓
4. X
5. ✓
6. ✓
7. ✓
8. ✓
9. X
10. ✓
11. X
12. ✓

5·7

1. b
2. a
3. b
4. a
5. c
6. b
7. F
8. T
9. F
10. T
11. T
12. F
13. Men and women come from different planets, and therefore they speak different languages and have different needs.
14. Feminism and the women's liberation movement, plus the availability of birth control and legalized abortion, changed women's roles.
15. a. W b. M c. W d. M e. W f. W g. M h. W i. M j. W k. M l. M

5·8 *Suggested answers:*

1. In order for love to grow and flourish, it needs to be nurtured and cared for.
2. Sometimes, men like to be close and intimate, but they also need to pull away and feel independent.
3. Women's emotional state moves up and down between feeling good about themselves and feeling depressed and vulnerable.
4. Men like to be alone in their own space to think things out for themselves without being bothered by anyone else.
5. Men offer solutions to problems.
6. Women like to give advice even when they are not asked for advice.
7. Men are more aggressive and active, like the Roman god of war.
8. Women are more caring and nurturing, like the Roman goddess of love.

5·9 *Answers will vary.*

5·10

1. W
2. M
3. M
4. W
5. W
6. M
7. W
8. W
9. M
10. W

5·11 *Answers will vary.*

6 Electric cars: Greener, cleaner driving

6·1 *Suggested answers:* vehicle, miles, automobile, engine, gas/gasoline, acceleration, traffic, highway, roads, parking lots, shoulder belts, headrests, catalytic converters, air bag, economy cars, exhaust, driving range, drivers, carmakers, trucks, internal combustion engine, taxis, delivery vehicles, buses, rental cars, service station, hybrids, sedan, coupe, SUV, pickup

6·2 *Consult a dictionary for definitions.*

1. stable, stabilize
2. legislative, legislate
3. globe, globalize
4. abandonment
5. consideration, considerable
6. consumption, consumable
7. excess, excessive
8. generation, generative
9. maintenance/maintainability, maintainable
10. registration
11. termination/terminal, terminal
12. contribution, contributory, contribute
13. decline
14. fluctuation
15. range
16. vehicular
17. —
18. —
19. —
20. converse

6·3

1. consider
2. annual
3. Conversely
4. terminate
5. declining
6. contributors
7. maintain
8. range
9. global
10. stability
11. consume
12. versions
13. vehicles
14. generate
15. fluctuate
16. abandon
17. legislation
18. devices
19. exceed
20. register

6·4

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

6·5

1. increasing, faster
2. major
3. has not been
4. The price of oil, government regulation
5. were not, pressure from the automotive and oil industries
6. are
7. has proven
8. making cars more energy-efficient and environmentally friendly
9. unlikely

6·6

1. b
2. c
3. a
4. b
5. b
6. c
7. T
8. T
9. F
10. F
11. T
12. F
13. The price of gasoline quadrupled, and people started buying more economical Japanese and European cars, which forced American carmakers to produce economy cars.
14. In 1990, CARB stipulated that two percent of all cars sold in California be zero-emission in 1998, and ten percent in 2003. The automobile industry tried to fight CARB, and only GM developed an electric car to meet the mandate's requirements.
15. A series hybrid uses a small gasoline or diesel engine to generate the power that drives an electric motor and recharges the battery pack; a parallel hybrid switches between a gasoline engine and an electric motor.
16. Electric cars have zero emissions, are cheaper to operate, have 90 percent efficiency, and reduce dependency on oil.
17. Hybrid cars are light, compact, quiet, and fuel- and energy-efficient, and shut off automatically at traffic lights.

6·7

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

6·8 *Suggested answers:*

1. In 60 years, the number of registered vehicles and miles driven per household increased twice as fast as the number of households.
2. In 50 years, the number of American households owning three or more cars increased nearly tenfold.
3. Japan produced one third of the world's cars in 2008. Car sales in China are projected to grow tenfold / to skyrocket.
4. In 20 years, CO_2 emissions from the U.S. transportation sector increased measurably.
5. The price of gasoline quadrupled.
6. Five times as many zero-emission cars had to be sold in California by 2003.
7. EV1s had a limited driving range.
8. It would take significantly more EVs to produce the same amount of CO_2 emitted by one conventional automobile.

6·9 *Answers will vary.*

6·10 *Answers will vary.*

7 DNA fingerprinting: Condemning evidence

7·1 *Suggested answers:* crime scene, crime-solving, police detective, forensic technician, evidence, hearing, offender, innocent, guilty, execute, prison, commit a crime, murderer, fingerprint, convicted, criminal, rape, murder, suspect, confess, killer, perpetrator, arrest, accused, defendant, defend, lawyer, investigator, detective, FBI, RCMP, law enforcement, judges, court, cold case, prison sentence, sexual assault, sentence, charged, victim

7·2 *Consult a dictionary for definitions.*

1. detectable, detect
2. evaluative, evaluate
3. investigation, investigative, investigate
4. sequential, sequence
5. legality, legalize
6. violence, violate
7. analysis, analytical
8. assemblage
9. challenge, challenging/challenged
10. exclusion, exclusive
11. identification, identifiable
12. location
13. implication, implicating
14. removal, removable
15. accurate
16. expert, expert
17. regional
18. availability, avail
19. consequence
20. obtainable

7·3

1. expertise
2. assembled
3. sequence
4. analyze
5. implicated
6. challenged
7. evaluation
8. obtained
9. accuracy
10. remove

7·4

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

7·5

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

7·6

Paragraph 2: Before DNA arrived on the scene, digital fingerprints were the key to determining an individual's identity.
Paragraph 3: DNA testing would not be where it is today without the discoveries of British geneticist Alec Jeffreys and American biochemist Kary Mullis.
Paragraph 4: In 1987, RFLP was used for the first time in the investigation into the rape and murder of two young girls.
Paragraph 5: While Alec Jeffreys was carrying out his lengthy research, Kary Mullis worked out, one night in 1983, an ingenious method to increase the amount of DNA available for testing.
Paragraph 6: Before DNA testing became a standard feature of the criminal justice system, legal hurdles had to be cleared.
Paragraph 7: Without standardization or scientific evaluation of their methods, these companies were engaged more in competing for dominance in a very profitable field than in ensuring the quality of their services.
Paragraph 8: In the late 1980s, DNA testing achieved legitimacy with the involvement of governmental agencies.
Paragraph 9: In 1992, a two-year federally funded National Research Council study recommended that DNA evidence continue to be used in courts, and in 1994, the scientific and law enforcement communities agreed that DNA evidence should be considered legitimate and admissible in court.
Paragraph 10: The widespread acceptance of DNA fingerprinting led to the establishment of DNA databases, beginning in Great Britain, where DNA evidence had been more widely embraced from the start.
Paragraph 11: In the United States, a law passed in 1994 laid the groundwork for the formation of a nationwide database.
Paragraph 12: DNA fingerprinting was not only bringing criminals to justice, but was also freeing wrongly convicted persons from long prison sentences.
Paragraph 13: Despite DNA fingerprinting's usefulness, significant issues temper its success.
Paragraph 14: While lawmakers debate the legal uses of DNA fingerprinting, the science will continue to prove itself outside the crime lab and court of law.

7·7

1. b
2. c
3. a
4. b
5. a
6. b
7. F
8. T
9. T
10. F
11. F
12. T
13. DNA is present in all human cells and cannot be easily removed from the scene by the criminal.
14. Innocent people are wrongly convicted of crimes because of mistaken identity, police misconduct, sloppy forensics, an incompetent defense, and a false confession made under pressure.
15. Mullis discovered the process of polymerase chain reaction, which made it possible to create billions of copies of DNA in a very short time.
16. Civil liberties organizations consider mandatory DNA testing an invasion of privacy and warn of the dangers of such information being made available to employers or insurance companies.
17. DNA testing can be used to establish paternity and family relationships, to identify the remains of soldiers missing in action, to match organ donors with potential recipients, to protect endangered plants and animals, and to reconstruct human history through genetics.

7·8

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

7·9

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

7·10 *Suggested answers:*

Paragraph 2: Before DNA technology appeared, mainly digital fingerprints identified criminals.
Paragraph 3: DNA technology wouldn't exist without the work of a British geneticist and an American biochemist.
Paragraph 4: Police employed RFLP in the late 1980s in order to solve two sexual assault and homicide cases.
Paragraph 5: Mullis discovered how to duplicate DNA in greater quantities for processing at the same time that Jeffries was carrying out his investigations.
Paragraph 6: Legal issues had to be settled before DNA was accepted as a common procedure.
Paragraph 7: In the absence of regulations, commercial laboratories put more effort into competition for profits than providing accurate test results.
Paragraph 8: In the late 1980s, government action led to the recognition of DNA technology.
Paragraph 9: In 1992, a federally sponsored study supported the use of DNA evidence in court, and two years later, scientists and police officials agreed to acknowledge its legitimacy as evidence.
Paragraph 10: The recognition of DNA fingerprinting resulted in the creation of DNA databases in Great Britain, where it had been accepted from the outset.
Paragraph 11: In the United States, 1994 legislation enabled the establishment of a national database.
Paragraph 12: In addition to convicting criminals, DNA evidence was getting innocent prisoners out of prison.

7·11 *Answers will vary.*

7·12 *Answers will vary.*

8 Eco-cities: Building sustainable urban communities

8·1 *Suggested answers:* communities, population, urban, home, dwellers, megacities, residents, suburban centers, public transportation, traffic, garbage, metropolitan, citizens, slums, living conditions, city management, municipal government, municipalities, settlements, buildings, urban sprawl, public services, green areas, parks, architects, planners, residential apartments

8·2 *Consult a dictionary for definitions.*

1. administrative, administer
2. aggregate, aggregate
3. communal, commune
4. immigration, immigrant, immigrate
5. invest
6. residence, residential, reside
7. secure, secure
8. trendy, trend
9. visible/visionary, envision
10. demonstration, demonstrative
11. incorporation
12. achievement, achievable
13. link
14. concentrate
15. fund/funds, fund
16. phase in
17. shift
18. principal
19. —
20. —

8·3

1. phases
2. consists of
3. funding
4. concentration
5. community
6. infrastructure, investment
7. links
8. shift
9. principles

8·4

1. a. administration b. administrative
2. a. demonstrate b. demonstrations
3. a. immigrated b. immigrants
4. a. investment b. invest
5. a. achieve b. achievement
6. a. resident b. reside
7. a. incorporate b. incorporation
8. a. vision b. envisions
9. a. security b. secure
10. a. trendy b. trend

8·5

Consult a dictionary for definitions.

1. n.
2. adj.
3. v.
4. v.
5. n.
6. v.
7. v.
8. n.
9. n.
10. v.

8·6

1. a. M b. SD
2. a. SD b. M
3. a. SD b. M
4. a. M b. SD
5. a. M b. SD
6. a. SD b. M
7. a. M b. SD
8. a. SD b. M

8·7

1. c
2. a
3. c
4. a
5. b
6. b
7. F
8. T
9. T
10. F
11. T
12. F
13. *Urbanization* is the demographic shift of a population from rural areas to urban centers.
14. People are attracted to cities because of their developed infrastructure, public transportation system, employment opportunities, better health care and education, and wide range of services.
15. The area required to meet the city's resource requirements and to absorb waste is divided by the city's geographical area.
16. The major problems facing modern cities are pollution, traffic congestion, waste production, and environmental destruction.
17. In Curitiba, a population explosion was brought on by immigration.
18. In Hammarby Sjöstad, residents began moving back to the city from the country.

8·8

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

8·9 *Suggested answers:*
Principle 2: Build communities that harmonize with the environment.
Principle 3: Develop the area in accordance with natural conditions.
Principle 4: Build cities that take up less space and use public transportation.
Principle 5: Save energy and integrate conservation technology into building.
Principle 6: Support the local economy.
Principle 7: Create a safe, healthy community.
Principle 8: Get local people involved in decisions.
Principle 9: Encourage citizen participation and democracy.
Principle 10: Support cultural diversity.

8·10
1. X
2. X
3. ✓
4. ✓
5. X
6. X
7. ✓
8. ✓
9. X
10. ✓

8·11 *Answers will vary.*

9 Solar energy: Power for the future

9·1 *Suggested answers:* power, terawatt, watt, sunlight, infrared radiation, heat, oil, coal, natural gas, heating, lighting, fossil fuels, combustion, generate, gasoline, electricity, electrical current, power grid, steam, turbine, electrical generator, water heater, power plant, thermal

9·2 *Consult a dictionary for definitions.*
1. conj.
2. adj.
3. n.
4. n.
5. v.
6. v.
7. n.
8. n.
9. adj.
10. v.
11. n.
12. n.
13. adj.
14. adj.
15. v.
16. v.
17. v.
18. n.
19. n.
20. adj.

9·3
1. subsidies
2. offset
3. capacity
4. incentive
5. alternative
6. output
7. albeit
8. source
9. policy
10. principal

9·4
1. constitutes
2. distribution
3. intense
4. recovery
5. Refined
6. vary
7. equivalent
8. prohibits
9. concentrated
10. promote

9·5
1. d (n.)
2. h (n.)
3. f (n.)
4. j (v.)
5. i (v.)
6. a (v.)
7. c (v.)
8. g (adj.)
9. b (adj.)
10. e (v.)

9·6 *Suggested answers:*

1. The sun is the most plentiful source of energy, and all life on Earth depends on sunlight.
2. Increasing consumption of fossil fuels results in their depletion and in pollution and global warming.
3. Passive solar energy occurs when sunlight passes through windows or is absorbed by walls; it can be used for lighting and heating.
4. PV solar technology uses solar cells, containing silicon, to convert sunlight into energy; it produces electricity on a small or large scale.
5. CSP concentrates the sun's radiation, using mirrors or collectors, to heat water or gas and drive a turbine or generator; it is used to produce large amounts of electricity for power grids. Smaller collectors heat water.
6. The principal issues are the supply of fuel, the impact on the environment, costs, energy payback, and long-term energy savings.
7. Solar energy has been more popular in Europe, Japan, and remote areas; it has not been popular in the United States, where the oil industry has a large influence on energy policy.
8. Because of global warming and consumer consciousness, the demand for solar energy is expected to grow significantly in the future.

9·7

1. c
2. b
3. c
4. b
5. a
6. c
7. F
8. T
9. T
10. T
11. F
12. F
13. a. PS b. PS c. CSP d. PV, CSP e. PV f. PS, PV, CSP g. PV
14. The main components of sunlight are visible light, ultraviolet light, and infrared radiation.
15. Solar energy doesn't produce CO_2 or pollution.
16. The 1973–74 OPEC oil embargo increased interest in solar energy in the United States.
17. The rising demand for solar energy in the United States is due to an increasing awareness of global warming, consumer demand, and government tax incentives.

9·8

1. ✓
2. X
3. X
4. ✓
5. X
6. ✓
7. ✓
8. ✓
9. X
10. X

9·9 *Suggested answers:*

1. Historically, people have honored the sun as an emblem of vigor and vitality.
2. Companies process 50 million barrels of oil into gasoline and other fuels daily.
3. Architects are integrating passive solar energy into environmental construction plans.
4. Sunlight dislocates electrons as it contacts the surface of a PV cell and releases electrical energy.
5. We often see PV panels on the walls and roofs of buildings.
6. Manufacturers construct solar arrays from smaller sections.
7. Homeowners get their money back in the energy they conserve within two to three decades.
8. Lower energy usage and the integration of conservation measures in residences achieve an earlier payback on initial outlay.
9. Engineers Bridgers and Paxton constructed the world's first commercial solar building in Albuquerque, New Mexico, in 1956.
10. Petroleum companies have a major impact on government energy decisions.

9·10 *Answers will vary.*

9·11 *Answers will vary.*

10 Healing circles: A gentler justice

10·1 *Suggested answers:* conflict, vandalism, rioting, theft, robbery, hate crimes, drive-by shootings, gang warfare, drunk driving, road rage, mass killing, sexual assault, offenses, violence, police, laws, sentencing, court cases, arrested, sentence, prosecution, defense, plaintiff, accused, justice officials, judge, offender, victim

10·2 *Consult a dictionary for definitions.*

1. v.
2. adj.
3. v.
4. n.
5. n.
6. v.
7. n.
8. n.
9. n.
10. n.
11. v.
12. n.
13. n.
14. n.
15. v.
16. v.
17. v.
18. n.
19. n.
20. adj.

10·3

1. outcome
2. assigning
3. conflict, resolved
4. convene
5. guidelines
6. consensus
7. monitors
8. refocus
9. cycle
10. objective
11. appropriate
12. response
13. philosophy
14. reinforced
15. adapt
16. transition
17. facilitator
18. features
19. ultimate

10·4

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

10·5

1. aboriginal, nonconfrontational
2. the community, equally, peacemaking
3. facilitator, does not take
4. formally, four, encourage
5. that everyone respects and listens to the speaker
6. consensus
7. time, commitment, an open heart
8. more likely, both victim and offender
9. internationally

10·6

1. c
2. a
3. a
4. c
5. b
6. c
7. F
8. T
9. F
10. F
11. T
12. T
13. In stage 1, the request for a healing circle is made. In stage 2, participants are informed, prepared, and trained. In stage 3, the circle is convened and there is dialogue and resolution. In stage 4, progress is monitored and mistakes are corrected.
14. The facilitator opens the circle; establishes the circle as a sacred place; ensures that participants follow guidelines, maintain respect, and feel safe; and steers the process toward an outcome.
15. The talking piece is an object of symbolic value. It is passed clockwise from person to person. The person holding it may speak or remain silent. The members of the healing circle must respect and listen to the person in possession of the talking piece.
16. The metastudy's conclusion was that victims were able to carry on a normal life again, offenders didn't commit their crimes again or harass their victims, and the community felt safer.
17. A consensus decision is one in which everyone arrives at the decision collectively and agrees to it. When everyone contributes to the decision and has a vested interest, it is more likely to succeed.

10·7

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

10·8 *Suggested answers:*

1. In North America, aboriginal healing, talking, and peacemaking circles heal communities and restore harmony.
2. Members have the same chance to express themselves directly in a respectful exchange.
3. People can modify (or tailor) healing circles to personal, educational, occupational, and various institutional situations.
4. Members receive background information, orientation, and instruction.
5. Healing circles foster storytelling.
6. Stories open people's hearts sooner and more effectively than forced recommendations or decisions from external sources.
7. People come to mutual decisions by discussing problems and solutions instead of trying to convince each other through formal argument.
8. The 1996 Mille Lacs Circle Sentencing Project introduced the first healing circle in Minnesota.

10·9 *Answers will vary.*

10·10

1. Circle of understanding
2. Support circle
3. Sentencing circle
4. Talking circle
5. Community-building circle
6. Conflict circle
7. Reintegration circle
8. Healing circle
9. Community-building circle
10. Sentencing circle
11. Celebration circle
12. Support circle
13. Circle of understanding
14. Healing circle
15. Conflict circle

10·11 *Answers will vary.*

11 Medical technology: New frontiers in health care

11·1 *Suggested answers:* stethoscope, sphygmomanometer, blood pressure, physical examination, X-rays, blood and urine tests, general practitioners, diagnose, treat, clinics, hospitals, patient, computer tomography, magnetic resonance imaging, tumors, biopsy, surgery, intensive care unit, physician, radiology, diabetes, glucose management, cholesterol levels, health care, surgeon, cancer, surgical instruments, nurses, nursing assistants, bandages, autoimmune disease

11·2 *Consult a dictionary for definitions.*

1. expansive, expand
2. instructive/instructional, instruct
3. interventional, intervene
4. procedural, proceed
5. visual, visualize
6. virtuality, virtualize
7. accumulation, accumulative
8. effect, effective, effect
9. extraction
10. append
11. network
12. display
13. equip
14. aid
15. conference
16. file
17. —
18. inevitability
19. radical
20. practice

11·3

1. instructions
2. accumulating
3. equipment
4. intervention
5. procedure
6. Visualization, technique
7. virtual
8. display
9. affect
10. files
11. appendages
12. practitioner
13. network
14. aid
15. conferred
16. inevitable
17. radical
18. extracted
19. expansion

11·4

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

11·5

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

11·6

1. a
2. b
3. b
4. c
5. b
6. a
7. T
8. T
9. F
10. F
11. F
12. T
13. Medical records are increasing in volume and complexity. When they are computerized, they are easier to store and access; cannot get easily lost; and can be easily copied, stored, and archived.
14. Surgeons can perform delicate surgical procedures with increased accuracy. Robotic appendages can eliminate tremor.
15. Robotic appendages cannot feel the tissue they are operating on.
16. People who are bedridden or housebound do not have to leave home to receive care, and they can monitor their own treatment by using software, troubleshooting wizards, and user-friendly medical websites.
17. Stem cells can be collected only from unused or cloned embryos. Some people believe that these embryos are living beings, while others question how stem cells will be used.

11·7

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

11·8 *Suggested answers:*

1. In addition to basic instruments to examine patients, the doctor uses her expert hands to discover internal irregularities in her patients.
2. Doctors continue to use traditional instruments and methods; however, technology is significantly changing how they determine the cause of sickness and appropriate therapies.
3. Although robotic appendages have no tactile sensation, technicians are in the process of enhancing their sensory capacities.
4. Despite significant technical challenges, nanotechnology seems to offer the hope of boundless possibilities in the field of cancer diagnosis and therapy.
5. Understandably, it will take considerable time because of expensive construction costs and a long time frame. . . .
6. There is no end to the potential uses of stem cells, due to their ability to locate diseased areas of the body and to keep indefinitely when frozen.
7. Specialists can oversee their patients and carry on a dialogue from remote locations, as well as keep in touch to discuss urgent cases.
8. In addition to facilitating the delivery of medical care in hospitals, computer networks shorten the travel time and distance for critical data exchange.
9. Laparoscopic surgery lessens a patient's suffering after a procedure; it also decreases the potential side effects of surgery.
10. In addition to financing research on embryos generated prior to 2001, the U.S. government believes in the essential value of stem cell research.

11·9 *Answers will vary.*

11·10 *Answers will vary.*

12 The Enneagram: Understanding our personalities

12·1 *Suggested answers:*
Positive traits: organized, thorough, principled, purposeful, patient, heroic, warm-hearted, generous, empathetic, thoughtful, caring, self-assurance, charm, energy, optimism, adaptability, inspiring, creative, sensitive, independent, innovative, inventive, self-reliant, perceptive, reliable, resourceful, optimistic, enthusiastic, productive, committed, strong, compassionate, attentive, trustworthy.
Negative traits: rigid, judgmental, highly critical, manipulative, seductive, possessive, moody, dramatic, miserly, detached, paranoid, cowardly, impulsive, narcissistic

12·2 *Consult a dictionary for definitions.*

1. adj.
2. n.
3. n.
4. v.
5. n.
6. adj.
7. v.
8. v.
9. adj.
10. n.
11. v.
12. adj.
13. n.
14. n.
15. n.
16. n.
17. n.
18. n.
19. n.
20. n.

12·3

1. status
2. comprehensive, aspects
3. comprised
4. psychology
5. factor
6. adjacent
7. approach
8. inherent
9. circumstances

12·4

1. attain
2. illustrations
3. isolated
4. Theoretically
5. distinction
6. optional
7. predict
8. pursuits
9. credited
10. mediator

12·5

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

12·6

1. a. M b. SD
2. a. SD b. M
3. a. M b. SD
4. a. SD b. M
5. a. SD b. M

12·7

1. c
2. a
3. b
4. c
5. a
6. c
7. T
8. F
9. T
10. T
11. F
12. T
13. Intuitive information can be belly-based, or physical; feeling-based, or emotional; or head-based, or mental.
14. A Four will behave like a Two under stress.
15. A Seven will behave like a Five in a situation where he or she feels secure.
16. The Enneagram system's purpose is to find our true selves through understanding our passions and preoccupations, and to develop meaningful relationships.
17. (1) d (2) f (3) h (4) c (5) a (6) i (7) e (8) b (9) g

12·8

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

12·9

Suggested answers:

1. The Enneagram uniquely symbolizes human consciousness.
2. The principal feature of each distinct type can become a neurotic habit or an ally in achieving self-knowledge.
3. Every type has two complementary, neighboring wings.
4. Ones object to rule-breakers.
5. Unguarded Eights can be giving, dedicated, and self-assured, and lead toward appropriate action.
6. Evolved, focused Nines listen carefully, soothe, and guide others.

12·10

1. The oldest theory of personality can be credited to ~~the Roman surgeon~~ Galen of Pergamon. . . .
2. ~~An ancient system rooted in Sufi mysticism,~~ the Enneagram (Greek *ennea* for "nine" and *grammos* for "point") identifies nine major aspects of being.
3. ~~Minimalists by nature,~~ Fives do not require wealth or ~~material~~ possessions, but they are ~~as~~ attached to their intellectual pursuits ~~as a miser who counts his gold in secret~~.
4. ~~Born peacemakers,~~ Nines can support ~~and sympathize with~~ all points of view.

12·11 Type One: The Perfectionist/Reformer
Chief feature: Resentment
Passion: Anger
Virtue: Serenity
Positive traits: Organized, thorough, principled, purposeful, patient, heroic
Negative traits: Rigid, judgmental, highly critical
Type Two: The Giver/Helper
Chief feature: Flattery
Passion: Pride
Virtue: Humility
Positive traits: Warm-hearted, generous, empathetic, thoughtful, genuinely caring
Negative traits: Manipulative, seductive, possessive
Type Three: The Performer/Achiever
Chief feature: Vanity
Passion: Deceit
Virtue: Honesty
Positive traits: Self-assured, charming, energetic, optimistic, adaptable, inspiring
Negative traits: Vain, preoccupied with image, dishonest, deceptive
Type Four: The Romantic/Individualist
Chief feature: Melancholy
Passion: Envy
Virtue: Equanimity (balance)
Positive traits: Creative, sensitive, emotionally deep
Negative traits: Moody, dramatic
Type Five: The Observer/Investigator
Chief feature: Stinginess
Passion: Avarice
Virtue: Detachment
Positive traits: Independent, innovative, inventive, self-reliant, perceptive
Negative traits: Private, fearful
Type Six: The Loyal Skeptic/Loyalist
Chief feature: Cowardice
Passion: Fear
Virtue: Courage
Positive traits: Reliable, resourceful, responsible
Negative traits: Suspicious, paranoid
Type Seven: The Epicure/Enthusiast
Chief feature: Planning
Passion: Gluttony
Virtue: Sobriety
Positive traits: Light-hearted, eternally optimistic, enthusiastic, adventurous, energetic
Negative traits: Distracted, impulsive, narcissistic
Type Eight: The Boss/Challenger
Chief feature: Excess
Passion: Lust
Virtue: Innocence
Positive traits: Generous, committed, self-confident, strong leader
Negative traits: Aggressive, assertive, controlling, impulsive, excessive
Type Nine: The Mediator/Peacemaker
Chief feature: Indolence
Passion: Sloth
Virtue: Action
Positive traits: Attentive, compassionate, trustworthy
Negative traits: Distracted, avoiding, lazy

12·12 *Answers will vary.*

12·13 *Answers will vary.*

13 Artificial Intelligence: Can machines think?

13·1 *Suggested answers:* gadget, electronic system, hand plow, wheel, Industrial Revolution, carts, train, automobile, telephone, radio, television, computer, mechanical, inventors, robot, toys, technology, circuits, device, hydraulically powered arm, assembly lines, industrial environment, mass production, components, valves

13·2 *Consult a dictionary for definitions.*

1. access, accessible
2. adjustment, adjustable
3. automation, automatic
4. collapse, collapsible
5. computation/computer, computational
6. construction, constructive
7. involvement
8. transformation, transformative
9. laborious, labor
10. approximation, approximate
11. conception, conceive
12. mechanics/mechanization, mechanize
13. assessment
14. assumption
15. enablement
16. exhibit/exhibition
17. component
18. logical
19. eventuality
20. survey

13·3

1. enable
2. automated
3. component
4. involves
5. conceivable
6. assume
7. eventually
8. exhibit
9. mechanical
10. assessed
11. survey
12. labor
13. logic
14. collapse
15. transformed
16. approximately
17. compute
18. access
19. adjust
20. constructed

13·4

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

13·5

Paragraph 2: The invention of machines and their widespread adoption have transformed human society.
Paragraph 3: Technological progress that had been thousands of years in the making accelerated rapidly with the advent of the electronic computer in 1941.
Paragraph 4: The idea of mechanical men has fascinated thinkers and inventors for centuries.
Paragraph 5: In the meantime, with cheaper, faster computer technology at their disposal, scientists could take up the quest for autonomous machines that philosophers and mathematicians could only imagine a century earlier.
Paragraph 6: In the late 1960s, microprocessors radically reduced the size of computers, making it possible to build mobile robots with an onboard "brain" linked to a mainframe computer.
Paragraph 7: Real progress with robots was made in the field of manufacturing.
Paragraph 8: Remote-controlled robots are also indispensable in space and underwater exploration, military reconnaissance, and search-and-rescue operations.
Paragraph 9: From manufacturing and exploration, robots have begun making their way into our personal lives.
Paragraph 10: Despite the amazing accomplishments in robotics, the ultimate goal still remains the creation of an independently thinking humanoid robot—in other words, a machine made in man's image.
Paragraph 11: Although research into humanoid robots has exploded around the world, the final product is far from reach.
Paragraph 12: While it is possible to construct a robot with a human form and one that can even communicate and mimic our behavior, the creation of a truly sentient, intelligent, and autonomous machine is another story.
Paragraph 13: Although this may be possible in principle, the value of living forever inside a machine seems questionable, if not ridiculous.

13·6

1. b
2. b
3. c
4. a
5. c
6. a
7. T
8. F
9. T
10. F
11. F
12. T
13. *Robot* comes from the Czech word *robota*; it was used in a play about a mad scientist who created artificial men.
14. Microprocessors made it possible to build robots with an onboard brain.
15. Robots eliminate human error, reduce manufacturing costs, perform monotonous jobs with precision, work around the clock, and speed up production.
16. Robots are used in space and underwater exploration, military reconnaissance, and search-and-rescue missions. They are used to investigate volcanoes, to adjust valves on underwater pipelines, to defuse bombs and clear mine fields, to assess damage after a nuclear accident, and to find people trapped in collapsed buildings or mines.
17. Robots can't see or maintain balance, reproduce, feel emotions and empathize, survive by their instincts, understand the consequences of their actions, or operate with purpose or understanding.

13·7

1. –
2. –
3. –
4. +
5. –
6. –
7. –
8. +

13·8 *Suggested answers:*

1. The invention of the steam engine—and later, the train, automobile, telephone, radio, and television—revolutionized the economy, human society, and long-distance communication.
2. Early attempts at creating mechanical creatures became museum exhibits.
3. Alan Turing and John McCarthy were responsible for opening up research into Artificial Intelligence after World War II.
4. A British neurophysiologist built the first mobile robots that could react to light and sound stimuli, and later to whistles in a conditioned response.
5. SAIL researchers pioneered the development of a robotic vehicle for space exploration. Despite their attempts to achieve automatic performance, it could operate only under controlled conditions.
6. Developed mostly in Japan, PUMA robots became commonplace in mass production, where they carried out dangerous, high-precision, and routine tasks on an around-the-clock basis.
7. A Japanese professor developed the first walking, talking, and piano-playing robots. Later, Honda built a small humanoid robot to perform basic, but limited, humanlike functions in amusement parks.
8. Obstacles to creating an intelligent, autonomous robot include overcoming a lack of balance, coordination, and natural movement, as well as constructing an independently functioning brain with sufficient capacity to process and store information like humans.

13·9 *Answers will vary.*

13·10 *Answers will vary.*

14 Voluntary simplicity: Making more out of less

14·1 *Suggested answers:* happiness, life, liberty, money, fame, power, family, relationships, work, adventure, creative, peace of mind, simplicity, affluence, well-being, consumerism, lifestyle, counterculture, nature, priorities, community, fashion

14·2 *Consult a dictionary for definitions.*

1. equation, equal
2. publication/publishing
3. release
4. utility/utilization
5. index
6. stressful, stress
7. error, err
8. individuality, individual, individualize
9. accompaniment
10. conformity
11. denotation
12. rejection/reject
13. —
14. bond
15. prioritize
16. formulaic
17. major
18. compatibility
19. —
20. —

14·3

1. stress
2. Index
3. utilize
4. bond
5. conform
6. majority
7. accompanied
8. erroneous
9. published
10. straightforward
11. denote
12. welfare
13. equate
14. priorities
15. individual
16. formula
17. seeking
18. rejected
19. release
20. compatible

14·4

1. grateful (adj.)
2. balance (v.)
3. fulfillment (n.)
4. ranks (v.)
5. budget (n.)
6. affluent (adj.)
7. clutter (n.)
8. foster (v.)
9. frugally (adv.)
10. durable (adj.)

14·5

1. Happiness, isn't
2. are not
3. lowest
4. North America
5. reduce
6. differentiates between
7. philosophy, individual circumstances

14·6

1. c
2. b
3. b
4. a
5. a
6. c
7. F
8. T
9. F
10. F
11. T
12. T
13. *Voluntary simplicity* means choosing freely and consciously to change one's life in a spiritual sense by getting rid of anything that controls one's life and takes away from what is really important for happiness and well-being.
14. "Wants" are what we desire, and "needs" are absolute necessities for survival and well-being.
15. The Happy Planet Index measures longevity, experienced well-being, and a country's ecological footprint.
16. The goals of the voluntary simplicity movement are to reduce consumption patterns and to minimize our personal impact on the environment.
17. Pressures from advertising, society, the media, family, and friends make it difficult for people to cut back on accumulating stuff.

14·7

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

14·8 *Answers will vary.*

14·9 *Answers will vary.*

14·10 *Answers will vary.*

15 Future directions: Ecology or technology?

15·1 *Suggested answers:* tragedy, collapse, dire, disaster, scare stories, overshoot, decimate, bubble, burst, crash, overflowing, trajectory

15·2 *Consult a dictionary for definitions.*

1. v.
2. v.
3. v.
4. n.
5. n.
6. v.
7. adj.
8. adj.
9. n.
10. n.
11. v.
12. n.
13. n.
14. adj.
15. v.
16. n.
17. v.
18. adj.
19. n.
20. adj.

15·3

1. crucial
2. confirmed
3. input
4. Coupled
5. acknowledged
6. rationality
7. uniformity
8. ideology
9. model
10. underlying
11. persistent
12. notion
13. intervened
14. core
15. explicit
16. constraints
17. simulate
18. poses
19. Unrestrained
20. commissioned

15·4

1. trajectory (n.)
2. exponentially (adv.)
3. urgent (adj.)
4. imminent (adj.)
5. dire (adj.)
6. provoke (v.)
7. inflate (v.)
8. forefront (n.)
9. increments (n.)
10. disseminate (v.)

15·5

1. Both warn us that humanity is on a path that could lead to disaster.
2. They used a computer model and fed data on population, food production, industrial production, pollution, and consumption of natural nonrenewable resources into a computer model that analyzed how the data interacted and came up with 12 projected scenarios. On that basis, they predicted that if humanity did not make significant changes, it would exhaust the planet's limits and face ecological collapse.
3. The political and business community tried to discredit the findings, because they were contrary to their notions of growth and profit, while others, including President Jimmy Carter, welcomed and supported the book.
4. *The Limits to Growth* became an international best-seller, and although it has been updated twice, its conclusions remain unchanged.
5. The exponential growth of population and the material economy could exhaust the planet's limited resources, increase pollution beyond tolerable levels, and exceed the planet's carrying capacity, which would result in overshoot. If no one pays attention or begins to act in time, overshoot could cause collapse.
6. Sustainability can prevent overshoot if humanity manages the consumption of nonrenewable resources, replaces them with renewable resources, and reduces pollution so that everyone will have enough to live on and future generations will be able to meet their needs.
7. People can use technology to make changes, but most importantly they have to change their values and the way they think about growth and the environment.

15·6

1. c
2. b
3. c
4. a
5. a
6. b
7. F
8. T
9. F
10. F
11. T
12. T
13. Exponential growth occurs when an entity doubles in number, then rapidly redoubles.
14. Overshoot occurs when an activity exceeds its physical limits.
15. Sustainability occurs when the needs of the present generation are met without compromising the ability of future generations to meet their needs.
16. To achieve sustainability, renewable resources cannot be used at a greater rate than they can be produced, nonrenewable resources cannot be consumed at a greater rate than they can be replaced by renewable resources, and pollution cannot be produced at a greater rate than the Earth can absorb or detoxify it.
17. The five factors were population, food production, industrial production, pollution, and consumption of nonrenewable natural resources.

15·7

1. cannot
2. went against popular beliefs
3. for humanitarian reasons
4. unpopular
5. they could go on doing the same things forever
6. it takes fewer women giving birth to keep the population growing
7. beliefs
8. wisely

15·8 *Answers will vary.*

15·9

1. X
2. X
3. ✓
4. X
5. ✓
6. ✓
7. X
8. ✓
9. ✓
10. X

15·10 *Answers will vary.*