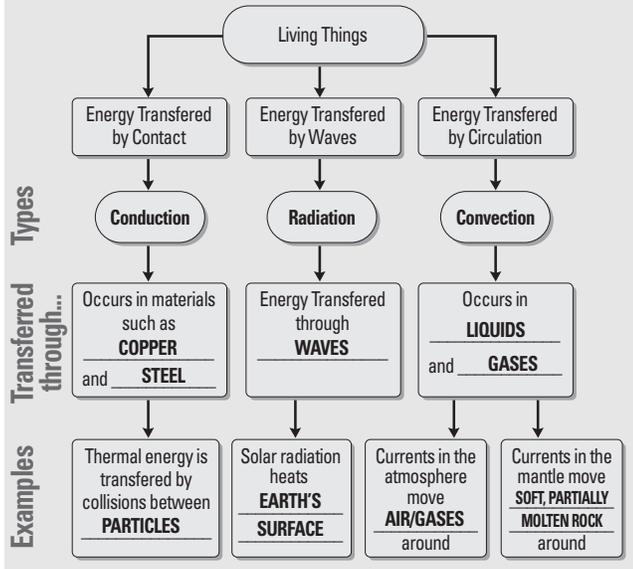


UNIT 4 REVIEW ANSWERS, p. 544–549

Visualizing Key Ideas

1. You may wish to provide students with BLM 4-41, Visualizing Key Ideas, to answer this question.



Using Key Terms

2. (a) True
 (b) True
 (c) False. *Most* forms of electromagnetic radiation are invisible to the naked eye.
 (d) False. Humans live in a layer of Earth's atmosphere called the *troposphere*.
 (e) False. The unit kilopascal is used in weather forecasting to indicate the *pressure* of an area.
 (f) True
 (g) True
 (h) False. The natural greenhouse effect makes Earth *warm enough* for human life.
 (i) **Note:** You may wish to delete this question.
 (j) False. A carbon sink *absorbs* carbon in the atmosphere.
 (k) True
 (l) True
 (m) False. Tectonic plates move over a partly melted layer of rock called the *asthenosphere*.
 (n) False. Trenches form at *convergent* plate boundaries.
 (o) False. Earthquakes occur because of a sudden *release* of energy between tectonic plates.
 (p) True

Checking Concepts

3. Celsius, Kelvin, Fahrenheit
 4. Heat is the transfer of thermal energy from an area of high thermal energy to an area of lower thermal energy. Thermal energy is the total energy of all the particles in a sample of matter.
 5. Electromagnetic radiation is the transfer of energy by waves radiating from a source.
 6. Students' answers will vary but may include heat waves distort the atmosphere, infrared radiation can melt ice, night-vision goggles identify heat signatures, etc.
 7. Troposphere
 8. Changes in temperature and composition
 9. Insolation is the measure of the amount of incoming solar radiation reaching Earth's surface.
 10. Cool, clear weather
 11. Atmospheric pressure is the pressure exerted by the mass of air above any point on Earth's surface.
 12. There is a smaller mass of air above any point to exert pressure.
 13. (a) Deflects winds to the left (when viewed from the South Pole)
 (b) Deflects winds to the right (when viewed from the North Pole)
 14. **Note:** You may wish to delete (d).
 (a) Warm front
 (b) Stationary front
 (c) Cold front
 15. Climate
 16. (a) Paleoclimatologists
 (b) Fossils, sediments, tree rings, glacial evidence
 17. Any three of: Earth's rotation, revolution, and wobble; water cycle; ocean currents; carbon cycle; catastrophic events
 18. Rotation, revolution, and wobble
 19. (a) An unusually warm layer of water moving eastward in the Pacific Ocean
 (b) At the equator in the Pacific Ocean
 20. A carbon sink absorbs carbon dioxide from the atmosphere.
 21. (a) Any three of: carbon dioxide, water vapour, methane, ozone, halocarbons
 (b) They absorb and emit heat in the atmosphere.
 22. GCMs are used to simulate the complex interactions of the atmosphere and climate by using computers.
 23. Mantle

24. Continental and oceanic
25. Lava
26. (a) W; (b) S; (c) R; (d) Q; (e) T; (f) V
27. Continental drift theory suggests the continents were once all together in a single giant land mass but have moved to their present locations.
28. At a hot spot, one plate slides over the top of a magma source. At a subduction zone, one plate slides over the top of another.
29. Seismometer or seismograph

Understanding Key Ideas

30. Celsius
31. Molecules come in contact with each other, transferring energy.
32. Molecules in a solid are closer together, making contact more likely, which transfers thermal energy.
33. At sea level, there is a greater amount of atmosphere over the surface, but at high altitudes there is less atmosphere.
34. About 34°C cooler
35. A biogeoclimatic zone is a region with a certain type of plant life, soil, geography, and climate.
36. Earth's wobble, a change in Earth's axis of rotation will affect the angle of incidence of the Sun's rays and thus the intensity of solar heating.
37. Volcanoes and earthquakes are associated with plate boundaries in locations where plates collide, spread apart, and slide past one another.
38. An increase in the amount of ultraviolet radiation reaching Earth
39. Coal forms from the burial and decomposition of tropical swamp material. Tropical swamps can occur only in warm areas. Places with coal deposits must have originated in warm areas. Antarctica must have once been closer to the equator.
40. (a) Radioactive decay heats mantle material. This material reaches the surface through volcanism.
(b) The Sun heats the molecules in the atmosphere. The Sun heats Earth's surface which heats the air through conduction.
(c) Energy left from Earth's formation continues to heat subsurface material.
41. (i) Water can move in circular currents.
(ii) Gases in the atmosphere can flow in circular currents.
- (iii) Soft, ductile mantle material can flow in circular currents.
- (iv) No, there is no material that can flow in currents.
42. Slab pull occurs at subduction zones, where a part of a plate dives into the mantle, pulling the plate material behind down with it. Ridge push occurs at spreading ridges, where mantle material reaching the surface pushes plates apart.
43. Note: Have students change the wording of this question to: "Compare the formation of a composite volcano to that of a *shield volcano*." Composite volcanoes form at subduction boundaries, where material from the subducting plate rises to the surface. Shield volcanoes form over hot spots, which are weak parts of lithospheric plates where magma breaks through.
44. Students' answers will vary but should include examples such as changes in water supply, change in biomes, increase in average temperatures, etc.
45. (a) Location A is continental crust, which is thicker than B, oceanic crust.
(b) C
(c) Crust at A and D would be the same age. They were previously together.
(d) C, mid-ocean ridge
46.

Weather	Both	Climate
Atmospheric conditions in a specific area over a short period of time	– Occurs in atmosphere – Affects life on Earth	Atmospheric conditions over a 30 year period
47. Global warming is associated with the introduction of immense quantities of greenhouse gases, from fossil fuels, in the last 150 years. The natural greenhouse effect is due to the natural presence of greenhouse gases produced by decay of organisms, respiration, weathering, etc.
48. If large amounts of ash were sent into the atmosphere, sunlight would be blocked in the lower atmosphere and reflected in the upper atmosphere.
49. In summer, Earth is tilted toward the Sun, with the Sun's rays hitting the surface more directly (closer to 90 degrees). In winter, the northern hemisphere is tilted away from the Sun and the angle of incidence is greater, resulting in lower temperatures.
50. Earth's rotation

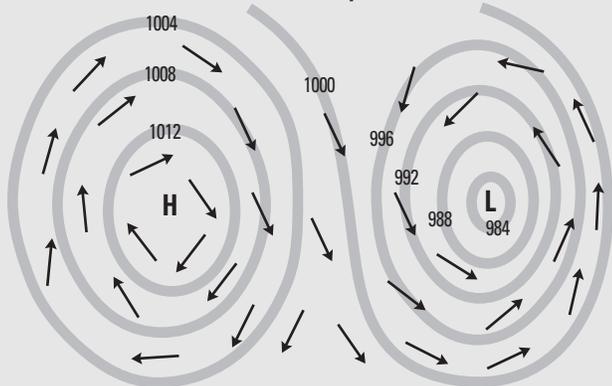
Thinking Critically

51. The molecules in a solid are closer together (more tightly packed, denser) than in a liquid, which makes it easier to transfer energy by contact.
52. Students' answers will vary, but an acceptable answer would be cold air coming down from the north.
53. Students' answers will vary but may include:
 Economic: changes in fisheries, forestry, wildlife, drought, famine, etc.
 Social: mass migration caused by drought and famine, etc.
 Environmental: change in biomes, increased sea level resulting in loss of land, desertification, etc.
54. Venus has a thicker atmosphere with 100 percent cloud cover.
55. Plates would stop moving, and earthquakes and volcanoes would stop.
56. Examples can be found in Table 11.2 on page 493 of the student book.

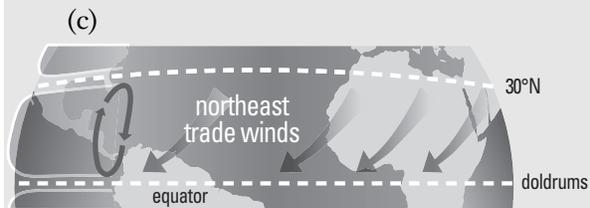
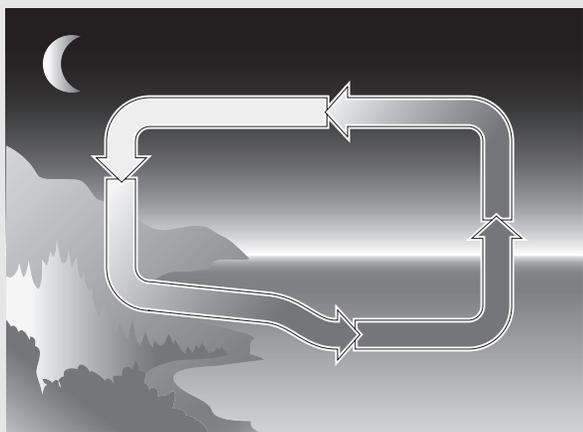
Developing Skills

57. (a) 7 min (b) ~12.5 min (c) ~3500 km
58. (a)

Wind is caused by air flowing from high pressure to low pressure
 Its direction is influenced by Earth's rotation

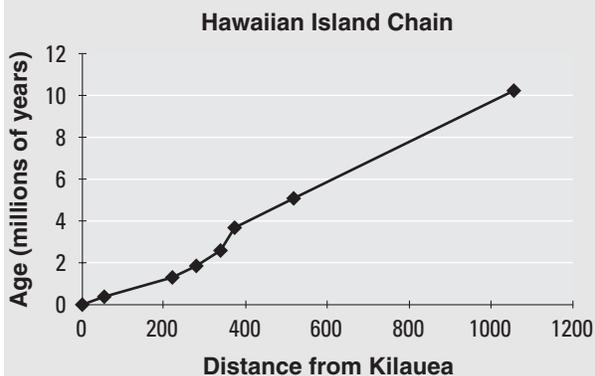


(b)



59. Sample answer: Convection in the mantle → rising material pushes plates apart → moving plates collide with other plates at subduction zones → plunging plate melts into mantle continuing the cycle

60.



- (b) Age increases with distance northwest from Kilauea.
- (c) ~8 million years
- (d) 10.3 cm/year

Applying Your Understanding

61. C
62. C
63. B and C are both true.
64. B
65. C

Pause and Reflect Answer

Students' concept maps will vary. Accept all reasonable maps. Some students may organize their points into short-term phenomena (today's highest temperature, amount of rain over the summer, etc.) and long-term phenomena (increasing average global temperature, increasing number of droughts) and show connections through conduction, convection, and radiation.