4. Primary pollutants are pollutants that are put into the air directly by human or natural activity. Secondary pollutants form when primary pollutants react with other substances.
5. Answers may vary. Household cleaners, paint products, dirty air heating and air conditioning vents, furniture and carpeting, heaters, and stoves can all be sources of indoor air pollution. There are many natural sources of air pollution, including dust, ash from volcanoes, pollen, and smoke.
6. The ozone hole is a thinning of the ozone layer in polar regions, particularly the Antarctic. Levels of ozone vary seasonally, but the ozone hole is caused primarily by CFCs that were released into the atmosphere by human activity.
7. Answers may vary. Accept any of the effects of air pollution on human health mentioned in this section. There are many ways that air pollution can be reduced. Legislation, such as the Clean Air Act, gives the Environmental Protection Agency the power to control the amount of air pollutants released from most sources. In addition, new technology has helped create cars that release fewer pollutants and devices, such as scrubbers, that reduce industrial air pollution.
8. Answers may vary. Cooperation is important to reducing air pollution problems that cross national boundaries.
9. Answers may vary. Students should note that it can take a long time before the effects of air pollution on an individual's health can be observed.
10. western New York and Pennsylvania; Answers may vary. Students may suggest that the prevailing winds concentrate the pollutants that contribute to acid precipitation on the Eastern seaboard.
11. Students may note that the prevailing winds and topographic features such as the Adirondack mountains concentrate acid precipitation over Buffalo.

Chapter Review

1. Sample answer: Air pressure is the measure of the force with which air molecules are pushing on a surface. Wind is the movement of air caused by differences in air pressure.
2. Sample answer: The troposphere is the lowest layer of the Earth's atmosphere. The thermosphere is the uppermost layer of the Earth's atmosphere.
3. Sample answer: The greenhouse effect is the Earth's natural heating process, by which gases in the atmosphere absorb and reradiate thermal energy. Global warming is a rise in average global temperature.
4. Sample answer: Convection is the transfer of thermal energy by the circulation of a liquid or gas. Thermal conduction is the transfer of thermal energy through a material.
5. Sample answer: A global wind is a large-scale pattern of air circulation in the atmosphere. A local wind generally flows short distances and can blow from any direction.
6. Sample answer: The stratosphere is the atmospheric layer above the troposphere, where temperature rises with altitude. The mesosphere is between the stratosphere and thermosphere, where temperature decreases with increasing altitude.
7. C
8. C
9. B
10. C
11. A
12. B
13. D
14. A
15. B
16. D
17. As altitude increases, there are fewer gas molecules. Gravity pulls most of the atmosphere's gas molecules close to the Earth's surface, which makes the lower layers more dense than the upper layers.
18. Air rises as it is heated because it becomes less dense.

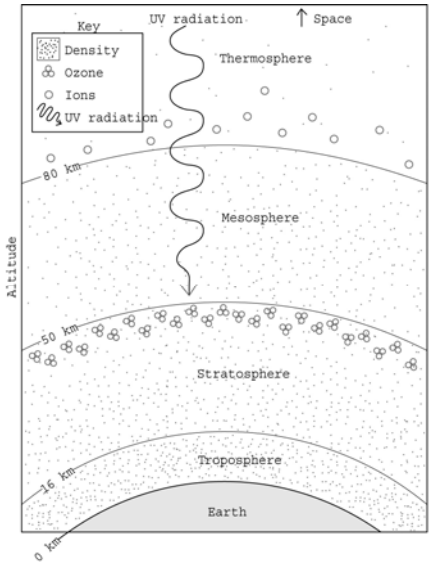
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19. The temperature differences in the atmosphere result mainly from the way solar energy is absorbed. Some layers are warmer because they contain gases that absorb solar energy.
20. Secondary pollutants form when primary pollutants react with other primary pollutants or with other naturally occurring substances. Acid rain is an example of a secondary pollutant.
21. An answer to this exercise can be found at the end of the Teacher Edition.
22. Sample answer: Global warming is a gradual rise in Earth's average temperature. It is possibly caused by an increase in the greenhouse effect.
23. The Coriolis effect would be greater if the Earth rotated twice as fast. The apparent deflection of winds is caused by the Earth's rotation.
24. Answers may vary. The greater concentration of carbon dioxide in Venus's atmosphere causes the greenhouse effect to be more extreme on Venus than on Earth.
25. The prevailing winds would be blowing east.
26. The boat would be traveling northwest.

Reinforcement

EARTH'S AMAZING ATMOSPHERE

1. A
2. C
3. D
4. B



Critical Thinking

1. No, it seems like an unreliable source. Many supermarket tabloids like this one are unreliable sources of scientific facts. Also, the scientist whose work is presented has no formal qualifications, and the fact that his last article is about a time machine makes him a doubtful source.
2. It will catch solid particles in the air. These include dust, ash, and smoke.
3. The particles cannot build up forever inside the machine. Eventually, the machine will fill up.
4. Answers may vary. Sample answer: (1) He incorrectly assumes that all air pollution is composed of solid particles. (2) He also assumes that all of the air pollution in the world can be sucked up by a single machine. (3) He assumes that the GBG5K will be able to distinguish between things we want in the air—such as insects, birds, and pollen—and things we do not want in the air—such as pollution.
5. Answers may vary. Sample answer: I would suggest that he redesign his machine to remove gaseous pollutants as well as unwanted solid particles.

Section Quizzes

SECTION: CHARACTERISTICS OF THE ATMOSPHERE

1. B
2. C
3. C
4. D
5. C
6. D
7. B
8. A

SECTION: ATMOSPHERIC HEATING

1. C
2. B
3. A
4. C
5. B
6. B
7. C

SECTION: GLOBAL WINDS AND LOCAL WINDS

1. A
2. A
3. C
4. C
5. B
6. B
7. B
8. D
9. A

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