Chapter 7 Summary

7.1 Factors That Affect Climate Change

Key Concepts

- Climate describes the standard weather conditions for a region at a given time of year, averaged over a long period of time. This includes expected temperatures, winds, precipitation, probability of storms, and hours of direct sunshine.
- The amount of energy that a location on the surface of Earth receives at any given time is determined by the angle of the Sun, which in turn depends on the latitude, time of year, and time of day.
- Winds, ocean currents, and the shape and size of continents affect climate.
- Earth reflects some of the solar energy that hits it back into space. The fraction of energy that is reflected by a surface is called albedo.
- Volcanic eruptions introduce gases and particles into the air that affect the reflection and absorption of energy from the Sun.
- Human activity affects climate by introducing particles and gases into the atmosphere that affect the absorption and transfer of energy from the Sun.

7.2 Describing Climates

Key Concepts

- Climate zones can be classified based on latitude or on weather factors such as precipitation rates and temperature ranges.
- Climatographs are useful tools for studying and comparing climates.
- Climate classification systems categorize the abiotic and biotic components of a region and allow scientists to compare different parts of the world easily.
- Biomes are large regions that have similar types of organisms. Each biome is associated with a particular climate.
- Ecozones and ecoregions are subdivisions of biomes and can be used to compare the climate conditions in nearby or distant locations.
- Some human activities, such as farming, depend on climate. Changes in climate may cause people living in different parts of the world to change their lifestyles.

7.3 Indicators and Effects of Climate Change

Key Concepts

- Global warming is the increase in the average temperature of the atmosphere and oceans over the past 100 years. It is the largest single indicator of recent climate change.
- As global temperature rises, polar icecaps are melting, which affects the lives of Arctic mammals, such as polar bears, and of traditional Inuit peoples of Canada.
- As atmospheric and ocean temperatures increase, sea level is rising. Rising sea level will affect large populations of humans who live on islands and along the coasts of the world's continents.
- As the global oceans absorb more carbon dioxide, the water becomes more acidic, which threatens coral reefs and oceanic food chains.
- Changes in wind and precipitation result from global warming. These changes may lead to water shortages throughout the world and possibly to more frequent and stronger storms.
- Climate change may affect the health of humans by increasing the incidence of certain diseases.
- Deforestation and desertification may result from higher temperatures and changes in precipitation.

Chapter 7 Review

Make Your Own Summary

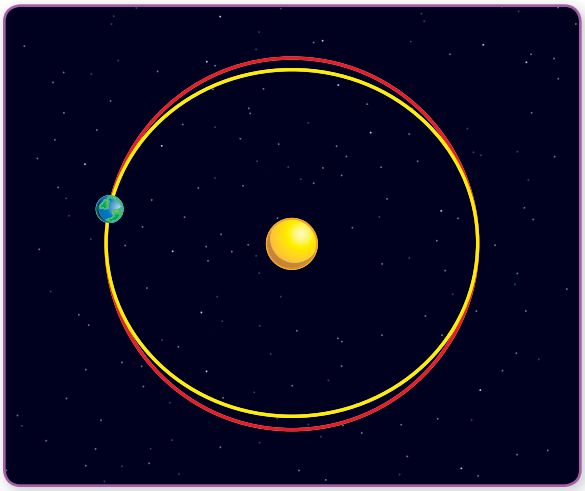
Summarize the key concepts of this chapter using a graphic organizer. The Chapter Summary on the previous page will help you identify the key concepts. Refer to Study Toolkit 4 on pages 565–566 to help you decide which graphic organizer to use.

Reviewing Key Terms

1. The average conditions of the atmosphere in a region over an extended period of time can be described as that region's _____. (7.1)
2. The _____ describes how gases in Earth's atmosphere absorb and release heat. (7.1)
3. The movement of _____ affects the locations and shapes of continents and oceans. (7.1)
4. Some climate change may be _____, which means it is caused by human activity. (7.1)
5. The average monthly temperature and average monthly precipitation for a region can be plotted on a _____. (7.2)
6. A _____ is a region of Earth's surface that is characterized by specific biotic and abiotic characteristics. (7.2)
7. Ecozones can be subdivided into smaller areas called _____. (7.2)
8. _____ is an increase in the average temperature of the air and water for the entire planet. (7.3)
9. Droughts and long-term declines in precipitation may lead to _____. (7.3)
10. The destruction of forests, called _____, can be caused by natural or anthropogenic factors. (7.3)

Knowledge and Understanding K/U

11. What is the hydrosphere?
12. The graphic below shows two orbits around the Sun. Which orbit, the red or the yellow, provides Earth with more consistent intensity of energy throughout the year? Explain your choice.



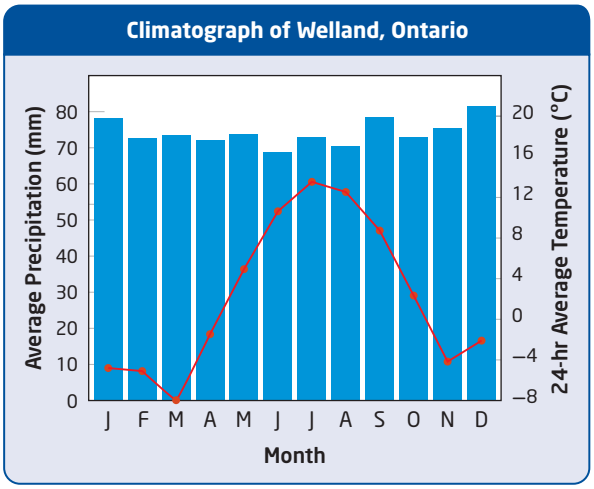
13. Summarize the greenhouse effect.
14. What causes the seasons?
15. List these events in order from fastest to slowest in terms of their ability to change the climate: change in ocean currents, formation of a mountain range, volcanic eruption, melting of a polar icecap.
16. About what percent of Earth's species are considered at risk of extinction due to climate change?
17. What is the value of climate classification systems such as the Köppen climate classification system?
18. How could the formation of a mountain range cause a desert to form?
19. How does Earth's albedo today differ from the albedo 20 000 years ago, during the last glacial period?
20. Explain why scientists do not classify climates based only on temperature records.

Thinking and Investigation T/I

21. How could decreases in precipitation cause water shortages around the world?

22. How can a volcanic eruption halfway around the world affect weather in Canada?

23. The graph below is a climatograph for Welland, Ontario. What does this graph tell you about the variation in monthly precipitation in Welland?



24. How can the climate be predicted for 10 years in the future even if we don't know what the weather will be like in 10 days?

25. Other than the growing season of crops, what consequences are there to having a warmer climate in Canada?

Communication C

26. BIG IDEAS Earth's climate is dynamic and is the result of interacting systems and processes. Write a brief summary that describes how latitude, proximity to large bodies of water, and location of jet streams affect the climate of Ontario.

27. BIG IDEAS Global climate change is influenced by both natural and human factors. Create a table that describes how the following factors affect climate: solar activity; Earth's orbit, tilt, and rotation; latitude; winds; ocean currents; albedo; tectonic plate movement; and human activity. Include information about how each factor changes climate and how long each factor takes to affect climate. Give your table a title.

28. BIG IDEAS Climate change affects living things and natural systems in a variety of ways. Create a graphic novel that illustrates how global warming may affect polar bears and humans in Canada over the next 50 years.

29. BIG IDEAS People have the responsibility to assess their impact on climate change and to identify effective courses of action to reduce this impact. Create a multimedia presentation that explains how the actions of people in Ontario have contributed to anthropogenic climate change. Suggest courses of action that the people of Ontario could take to reduce their contribution to climate change.

30. Create a flowchart that shows how climate change can result in increasing incidence of waterborne diseases in humans.

Application A

31. How might snowier winters slow global warming?

32. An argument against taking action on climate change is that we do not know what changes would have taken place without us, so we cannot know what effect our actions are having on the environment. How can scientists tell which changes are created by human activities and which are not?

33. Describe how an increase in the number and intensity of hurricanes in the Atlantic Ocean could affect Ontario.

34. Why does a climatograph have scales on both the right and left sides?

35. Scientists agree that warmer oceans lead to stronger and more frequent storms. However, evidence suggests that a century-long hurricane cycle may explain the increased intensity and frequency of hurricanes in recent years. If this pattern does exist, how would the intensity and frequency of hurricanes change over the next few decades? Explain your answer.