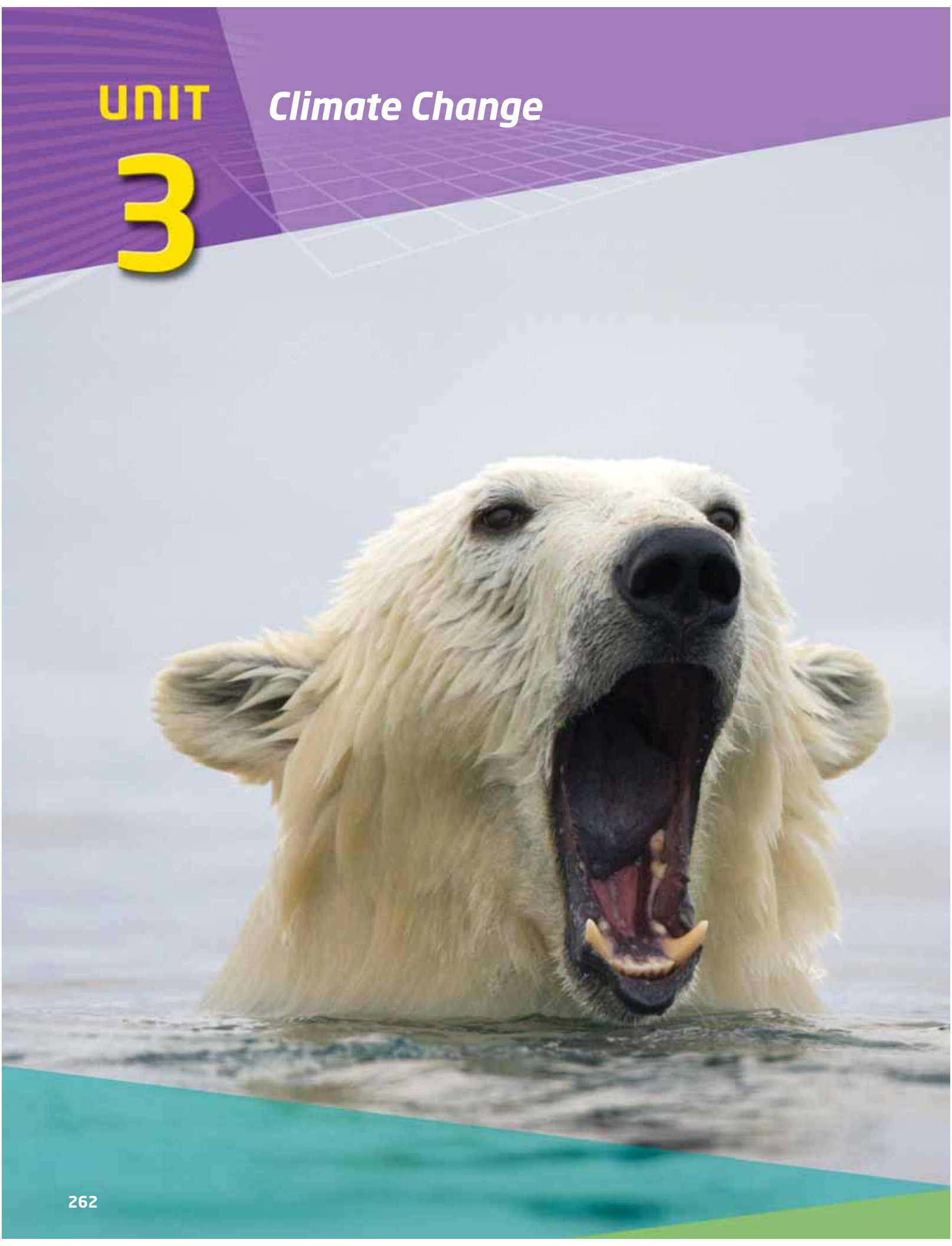
UNIT 3

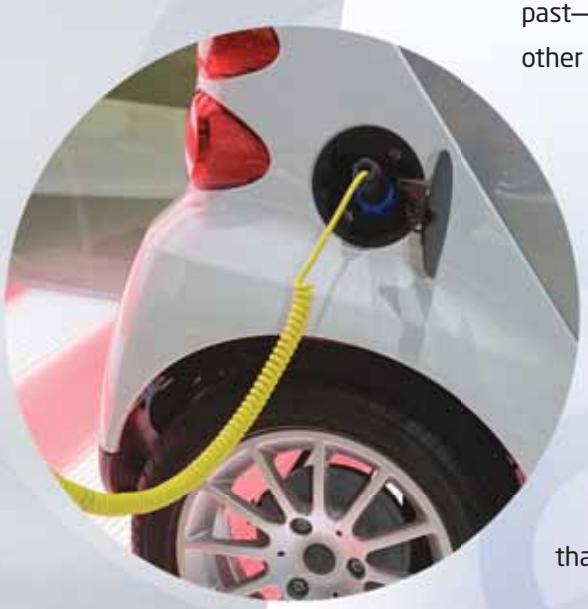
Climate Change



BIG IDEAS

- People have the responsibility to assess their impact on climate change and to identify effective courses of action to reduce this impact.
- Earth's climate is dynamic and is the result of interacting systems and processes.
- Global climate change is influenced by both natural and human factors.
- Climate change affects living things and natural systems in a variety of ways.

Polar bears are powerful swimmers. But every year, they are forced to swim longer distances to find safety and food in their Arctic habitat. Polar bears live on large areas of sea ice over which they roam in search of prey. In recent years, sea ice has been melting and breaking up at higher rates than in the past—thus threatening the habitats of polar bears, seals, and other marine mammals.



Why are warmer temperatures causing Earth's ice cover to melt? In this unit, you will find answers to this question, and to many others related to global warming and climate change. You will learn about the causes and effects of climate change, both natural and human-made. You will also learn about individual, community, and government initiatives to slow down climate change in ways that will benefit the environment. One step in the right direction, shown here, is the switch to using energy-efficient technologies that do not rely on burning fossil fuels.

What strategies can individuals, communities, and governments use to address climate change?

Chapter 7
Earth's Climate System

Chapter 8
Dynamics of Climate Change

Chapter 9
Addressing Climate Change

Get Ready for Unit 3

Concept Check

1. Many human activities have an effect on the climate in a region. List as many climate-changing human activities as you can. Refer to the illustration below, and think about your prior knowledge as well.
2. Categorize each human activity you listed for question 1 as either negative (for example, raises global temperature or increases pollution) or positive (for example, lowers global temperature or reduces pollution). Record your answers in a T-chart. With a partner, brainstorm less-harmful alternatives to the activities you categorized as negative.
3. What do you know about carbon dioxide? In your notebook, create a concept map that illustrates the role carbon dioxide plays in the following processes: photosynthesis, cellular respiration, and global warming. Use linking words and/or explanations to describe the connections among the processes.
4. In your notebook, match each type of heat transfer listed in the box with its definition below.

convection	radiation	conduction

   a. the emission or transmission of energy in the form of rays, waves, or particles

   b. the movement or transmission of energy by direct contact between molecules or substances

   c. the transfer of energy that occurs as a result of the movement of a fluid that has been warmed or cooled

5. Which types of heat transfer are occurring in the illustration below? Explain your answer.

Inquiry Check

6. Analyze and Interpret The following investigation was conducted by a student attempting to model one aspect of the greenhouse effect—that atmospheric carbon dioxide acts as a heat trap.

i. Two identical glass jars were each filled with 500 mL of water that had a temperature of 2°C.

ii. Both jars were sealed, and one was wrapped in a clear plastic bag.

iii. Both jars were left in the Sun for one hour.

iv. After one hour, the jars were opened and the temperature of the water in each glass jar was measured.

a. Why did the student use a clear plastic bag? What did the plastic bag represent in terms of the greenhouse effect?

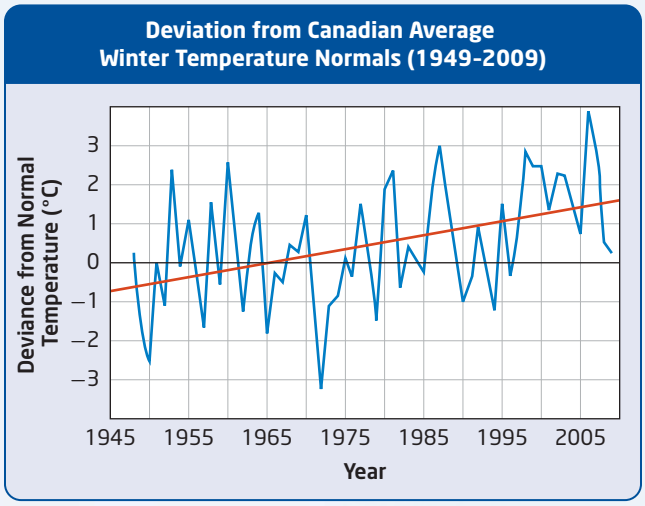
b. What variables did the student control?

c. List safety precautions that would be necessary for this procedure.

d. How would you modify this procedure to more closely model the greenhouse effect?

Numeracy and Literacy Check

7. Analyze Use the graph to answer the questions.



a. What trend does the graph indicate is occurring in average winter temperatures in Canada?

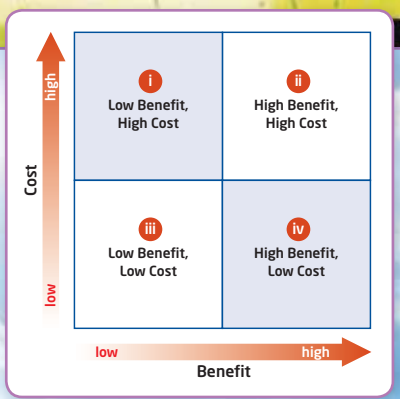
b. A line of best fit has been drawn in red to show the long-term trend. Using this line, determine the overall change in average temperature from 1950 to 2005.

8. Write Use a T-chart to list some possible positive and negative effects of climate change.

Looking Ahead to the Unit 3 Projects

At the end of this unit, you will have an opportunity to apply what you have learned in an inquiry or research project. Read the Unit 3 Projects on pages 390–391. Start a project folder now (either paper or electronic). Store ideas, notes, news clippings, website addresses, and lists of materials that might help you to complete your project.

Inquiry Project
Investigate how ground cover can help reduce the temperature near the Earth's surface.



An Issue to Analyze
Perform a cost-benefit analysis of possible actions to deal with climate change.