2. $\frac{1\,700\,000\text{ a} - 10\,000\text{ a}}{1\,700\,000\text{ a}} \times 100\% = 99.4\%$

   About 99.4% of the Quaternary Period is taken up by the Pleistocene Epoch.

3. The climate during the Pleistocene Epoch was cold with repeated glaciations.

4. The animals living in Alberta during the Pleistocene Epoch were large and, in some cases, very woolly mammals.

5. **a.** A continental ice sheet is a large mass of ice that covers much of a continent. It forms when annual snowfall exceeds annual melting.

   b. A mountain glacier is a mass of ice that forms in mountainous areas due to high snowfalls at high altitudes.

6. Ice cores contain tiny bubbles of atmospheric gases from the past. By analyzing the oxygen-18 to oxygen-16 ratios in annual layers, scientists can chart changes in the average temperature over hundreds of thousands of years.

7. Over the past 160 000 years, Earth's temperature has fluctuated. Most of the time the temperature has been far below what it is today, corresponding to major glaciations. The last one ended 10 000 years ago.

8. Methods of tracking Earth's average temperature are noted in this chart.

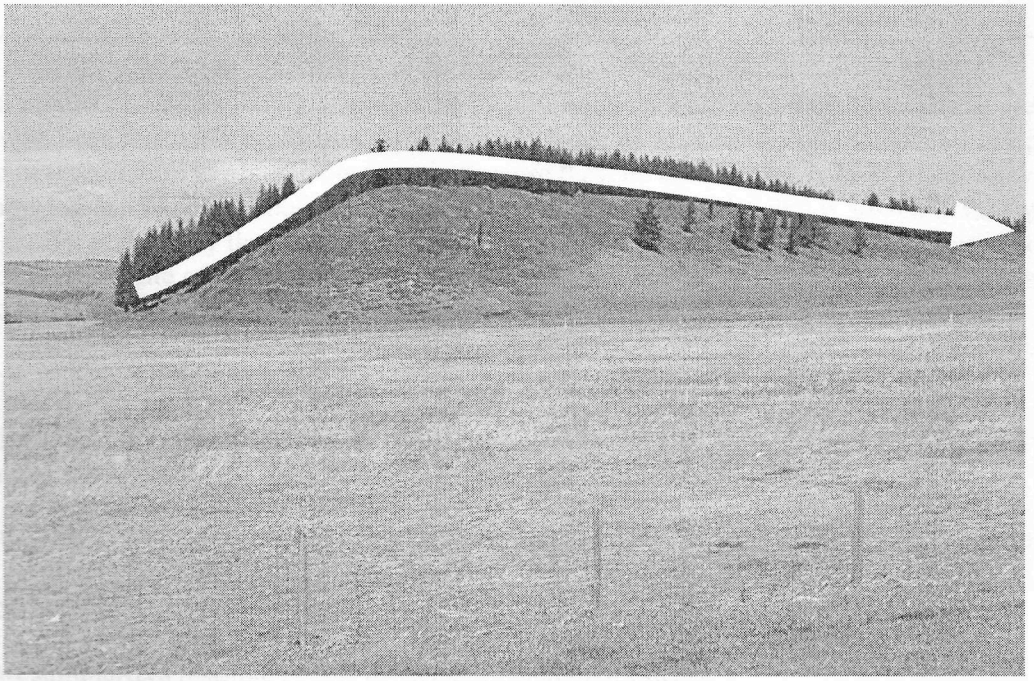
	Deep-Sea Sediment Cores	Ice Cores
Compare	• Both use the ratio of oxygen-18 to oxygen-16 stored in chronological layers to determine the temperature. • Both rely on relationships between the ratio of oxygen-18 to oxygen-16 and average temperatures that are established through present observations.	
Contrast	• Oxygen is stored as calcium carbonate from the shells of microscopic marine organisms, such as *Foraminifera*. • These cores can be used to study climate from more than 70 million years ago.	• Oxygen is stored in annual layers of ice. • The deepest ice core only reaches back 420 000 years.

9. Mountain glaciers and ice sheets around the world have been melting over the past century—especially in the last few decades—due to a global-warming trend. Many scientists believe that this warming trend is caused by human activities, such as the burning of fossil fuels that release the greenhouse gas known as carbon dioxide.

Applying Concepts

10. **a.** This is a teardrop-shaped hill called a drumlin. Drumlins form as an advancing ice sheet plucks up till and deposits it in a characteristic teardrop shape.

b. The direction of ice flow is from the rounded end of the drumlin to the pointed end.



11. The bowl is called a cirque. It is carved out by a mountain glacier.

Practice, page 384

This next group of questions introduces some key terms. It also not only helps you draw connections between the concepts represented by these terms but also asks you to begin to explore the relationship between cause and probability. These are complex and abstract ideas, but they may help you plot a course through the stormy waters of climate-change theory.

7. Cause indicates a chain of events where one leads to the next, so that the nature of the first event determines the outcome of the subsequent event. Correlation may be coincidence or causation. If the events are only correlative, changing one of them will not affect the other. It is also possible that both events are outcomes of the same unknown cause.

8. Decreases in temperature do not cause rain. Rain and temperature decreases are both the outcomes of cloud formation, which is increased by warm weather and a whole host of other variables. During the summer, solar energy during the day evaporates water, which then condenses to form clouds. When the water droplets that make up the clouds reach a critical size, they return to the ground in the form of rain. Clouds in the summer have a cooling effect because they block out the Sun's radiation.