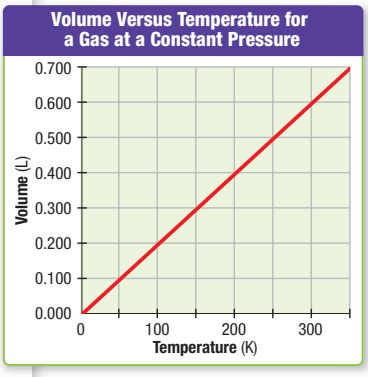
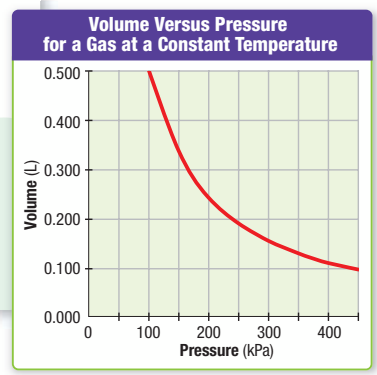
Graphing Skills Interpreting Graphs

The top graph shows volume versus temperature for a gas at a constant pressure. What can be determined from this graph about the relationship between volume and temperature?

1 Determine whether the relationship is direct or inverse.	In a *direct* relationship, the two variables change in the same direction. In an *inverse* relationship, they change in opposite directions. In this graph, temperature increases as volume increases, so the relationship is *direct*.
2 Study the shape of the line.	If a graph is a straight line, one variable is directly or inversely *proportional* to the other. If a graph is a curve, the relationship is more complex. Because this graph is a straight line, temperature is *directly proportional* to volume.





Practice

1. Which gas law does the straight-line graph represent?
2. Is the relationship shown by the curve in the bottom graph a direct relationship or an inverse relationship?
3. Is this relationship proportional?
4. Which gas law is represented by the curved graph?

Section 4 Review

KEY IDEAS

1. **List** four properties of gases.
2. **Explain** why the volume of a gas can change.
3. **Describe** how gases are different from solids and liquids, and give examples.
4. **Identify** what causes the pressure exerted by gas molecules on their container.
5. **Restate** Boyle's law, Charles's law, and Gay-Lussac's law in your own words.

CRITICAL THINKING

6. **Applying Concepts** Identify a real-life example for each of the three gas laws.
7. **Making Inferences** Why do gases have low densities?
8. **Relating Concepts** When scientists record the volume of a gas, why do they also record the temperature and the pressure?
9. **Making Predictions** Predict what would happen to the volume of a balloon left on a sunny windowsill. Which gas law predicts this result?

Math Skills

10. A partially inflated weather balloon has a volume of 1.56×10^3 L and a pressure of 98.9 kPa. What is the volume of the balloon when the balloon is released to a height where the pressure is 44.1 kPa?

Formative Assessment

Which law relates the effect of temperature on the volume of a gas?

A. Boyle's law (Incorrect. Boyle's law describes the relationship between volume and pressure.)

B. Gay-Lussac's law (Incorrect. Gay-Lussac's law describes the relationship between temperature and pressure.)

C. Charles's law (Correct. Charles's law describes the relationship between temperature and volume.)

D. All of the above (Incorrect. Only Charles's law describes the relationship between temperature and volume.)

Answers to Section Review

1. Gases flow, have low density, are compressible, and expand to fill their containers.
2. Sample answer: Attraction between gas particles is not strong, so the volume of a gas can easily change.
3. Unlike solids and liquids, gases have very low densities and can easily change volume. This makes them suitable for filling tires, balloons, and scuba tanks.
4. The pressure exerted on a container by a gas is caused by the gas particles colliding with the walls of the container.

Answers continued on p. 109A

Graphing Skills

Answers to Practice

1. The graph shows Charles's law because the line illustrates a linear relationship in which volume increases as temperature increases.
2. The slope of the curve is downward, so it shows an inverse relationship.
3. No, the relationship is not proportional because the graph is not a straight line.
4. Boyle's Law is illustrated because the curve shows that pressure increases as volume decreases.

Close

Reteaching Key Ideas

Gas Laws On the board, draw three columns with the following headings: "Boyle's law," "Charles's law," and "Gay-Lussac's law." Ask student volunteers to fill what they know about each law under each heading. Then, ask students to perform a sample calculation based on each law. LS Logical