(b) Student answers will vary. Students could present the argument that none of the suggestions are impractical and not likely to result in any improvement in air quality. All alternatives are reasonable in scope and expectations.

9. Student answers will vary depending on personal viewpoints. Students could answer that they believe that the proposed solutions to air quality problems will work if carefully implemented. The suggestions presented in this section are reasonable reductions in everyday activities. By simply making conscious decisions about the time of day to undertake an activity, the amount of air pollutants produced on a bad air day can be greatly reduced.

Extension

10. Student answers may vary. Student answers may include the following points in their discussions of how individuals can contribute to the improvement of air quality through their choice of transportation.
    - Follow refuelling instructions for efficient vapour recovery. Be careful not to spill fuel and always tighten the gas cap securely.
    - Refuel cars and trucks after dusk.
    - Keep car, boat, and other engines tuned up according to manufacturers' specifications.
    - Be sure your tires are properly inflated.
    - Carpool, use public transportation, bike, or walk whenever possible.
    - Choose a cleaner commute—share a ride to work or use public transportation. Bicycle or walk to errands when possible.
    - Defer use of gasoline-powered lawn and garden equipment.
    - Combine errands and reduce trips.
    - Limit engine idling.

4.17 THE TAGA

TECH CONNECT 4.17 QUESTIONS

(Page 357)

Understanding Concepts

1. The Trace Atmospheric Gas Analyzer (TAGA) can detect general concentration levels of airborne contaminants in the low parts per billion (ppb) range.
2. Possible uses for a mobile TAGA testing unit include:
    - random sampling of air quality in areas located away from a permanent testing facility
    - sampling air in specific locations to determine if air quality may be compromised
    - determining if air quality in a specific location may pose a health threat
    - investigating and identifying airborne contaminants of a known or unknown origin

Making Connections

3. The TAGAs that were used at Ground Zero in the aftermath of the 9/11 tragedy in New York were used to take samples of the air and dust, and to analyze the samples for the presence of pollutants that might pose a health risk to emergency workers. The samples were evaluated against standards and guidelines established to protect public health under various conditions.

    The TAGAs were used to measure levels of airborne contaminants, such as benzene, dichlorodifluoromethane, and trichlorofluoromethane.

UNIT 4 SUMMARY

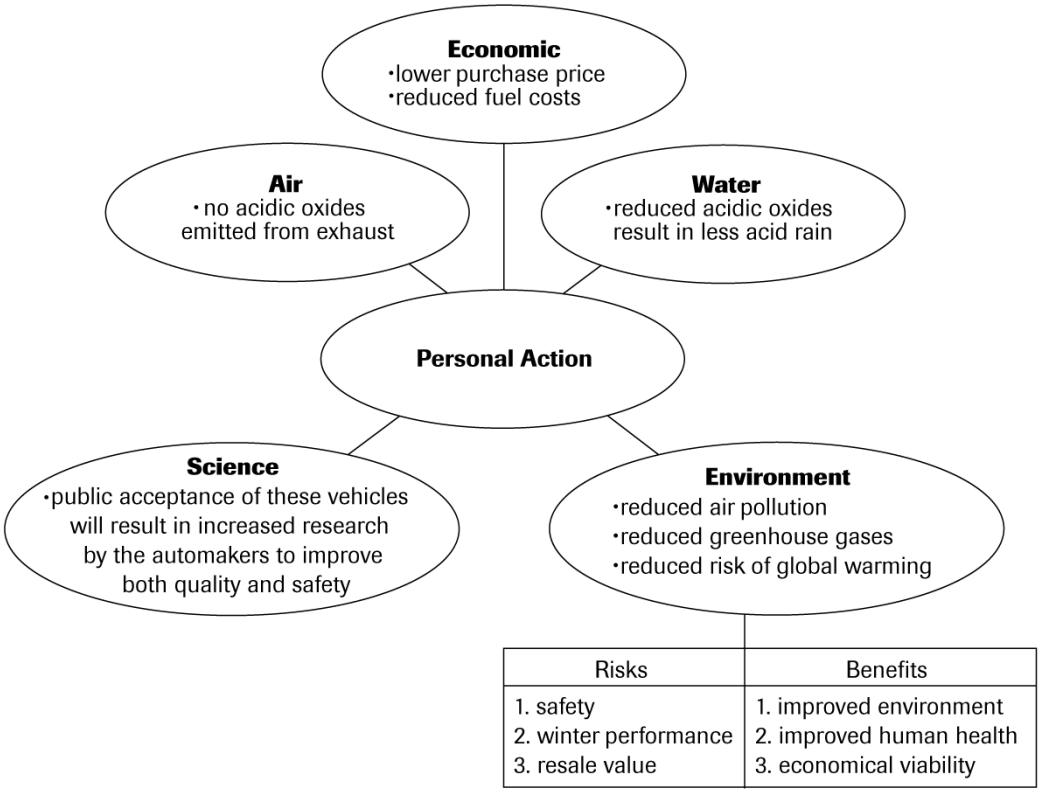
MAKE A SUMMARY

(Page 360)

Student answers will vary. Answers should include a risk–benefit analysis of the action.

(a) Personal action: purchasing a hybrid vehicle

(b)–(c)



Risks	Benefits
1. safety	1. improved environment
2. winter performance	2. improved human health
3. resale value	3. economical viability

UNIT 4 PERFORMANCE TASK: A MICROSCALE ANALYSIS OF HARD WATER

(Pages 361–362)

The following is a sample Perfomance Task report.

DETERMINING THE HARDNESS OF WATER

Purpose

The purpose of this investigation is to test water samples for hardness using a titration procedure.

Question

Which water sample, from a variety of sources, is the hardest?

Experimental Design

Different water samples, including distilled water, were titrated with a 0.01-mol/L solution of EDTA to determine their relative hardness. The water samples were treated with pH 10 buffer solution, and Erichrome Black T indicator. The volume of EDTA solution required for titration to the end point for each sample was recorded. The concentration of hard water ions in each sample was calculated based on the volumes of EDTA required to reach the end point. The independent variable is the number of hard water ions in the water samples being tested; the dependent variable is the volume of EDTA added to each sample; the control is the sample of distilled water. The temperature and the pH of the water samples are also controlled.

Materials

eye protection	lab apron
Erichrome Black T indicator	pH 10 buffer
well plate	microdropper
150-mL beakers	0.01-mol/L EDTA
water samples	distilled or deionized water