

Answer the following questions on a separate sheet of paper. Where appropriate use complete sentences.

## Section 1.1

1. What is matter?
  2. What is chemistry?
  3. What are the five major areas of chemistry?
  4. Identify the appropriate area of chemistry for each of the following examples.
    - a. Investigating ways to slow down the rusting of steel
    - b. Developing a better insulin-delivery system for diabetics
    - c. Determining the amount of mercury present in a soil sample
    - d. Comparing the hardness of copper and silver
    - e. Developing a new carbon-based fiber for clothing
  5. What is the difference between pure and applied chemistry?
  6. Why is the study of chemistry important?
  7. List three things in the natural world chemistry can explain?
  8. List three careers that require some knowledge of chemistry.
  9. What role does the knowledge of chemistry play in being an informed citizen?
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## Section 1.2

1. Is the following statement true or false? Chemists design materials to fit general needs.
  2. In George de Mestral's hook-and-loop tapes, were the hooks macroscopic or microscopic?
  3. List two ways to meet the demand for energy.
  4. How does insulation help conserve energy?
  5. How are soybeans used as a source of energy?
  6. How do chemists contribute to agriculture?
  7. What are two ways that chemists work to protect the environment?
  8. What strategies have been used to prevent lead poisoning in children?
  9. Why won't the method used to discover the chemical composition of stars work for the moon and planets?
  10. Look at Figure 1.14 on page 17. What is the key difference in the methods scientists used to analyze rocks from Earth's moon and Mars?
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## Section 1.3

1. What role did alchemy play in the development of chemistry?
  2. What experimental evidence did Lavoisier use to help transform science?
  3. What is the scientific method?
  4. What do scientists do if the results of an experiment do not support the hypothesis?
  5. The variable that you change during an experiment is the \_\_\_\_\_.
  6. The variable that is observed during an experiment is the \_\_\_\_\_.
  7. What does it mean that "a theory can't be proven."?
  8. What is a scientific law?
  9. Which of the following statements expresses a scientific law.
    - a. As the temperature of a balloon increases, the balloon expands.
    - b. Increasing the temperature of a balloon might cause it to burst.
    - c. If all other variables are kept constant, the volume of a gas increases as the temperature increases.
    - d. Sometimes increasing the temperature of a gas causes the gas to expand.
  10. What are some reasons that scientists choose to collaborate?
  11. How are journals helpful to scientists?
  12. What are the advantages and disadvantages of the Internet?
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## Section 1.4

1. What is involved in effective problem solving?
2. What are the three steps for solving numeric problems?
3. What must you determine first when solving a word problem?
4. What are two skills that you may need to use as you calculate an answer to a problem?
5. If your answer to a problem does not seem reasonable, list two things you can do.
6. After you identify the known and unknown in a conceptual problem, what should you do next?
7. What are the steps for solving conceptual problems?