Lesson Check Answers

1. Living and nonliving things are made of matter, and chemistry is the study of matter.
2. organic chemistry, analytical chemistry, biochemistry, physical chemistry, and inorganic chemistry
3. chemistry as the central science; electrons and the structure of atoms; bonding and interactions; reactions; kinetic theory; the mole and classifying matter; matter and energy, carbon chemistry
4. Pure research can lead directly to an application; an application can exist before research is done to explain how it works.
5. An analytical chemist focuses on the composition of matter.
6. a and c
7. **BIG**IDEA *Sample answer:* A doctor needs to understand reactions that take place in the body as well as factors that can interfere with these processes.

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8. explaining the natural world, preparing for a career, being an informed citizen.
9. Students should cite some of the examples from the lesson.
10. They gather data from afar and analyze matter brought back to Earth.
11. Students should use data from Figure 1.7 to support their opinions.
12. A possible answer is that knowledge of chemistry helps a citizen evaluate data and arrive at an informed opinion about a public issue that involves technology.
13. **BIG**IDEA Students will likely focus on the three general reasons presented in the lesson. They may also note how central chemistry is to the friend's life.

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14. He helped transform chemistry from a science of observation to a science of measurement.

15. *Sample answers:* making observations, testing hypotheses, and developing theories

16. They help increase the likelihood of a successful outcome.

17. They developed the tools and techniques for working with chemicals.

18. She made drawings of his experiments and translated scientific papers.

19. Articles are reviewed by experts in the author's field of research.

20. so that other scientists can repeat the experiments and confirm the results

21. It guides the design of the experiments.

22. A theory is a well-tested explanation of a broad set of observations; a hypothesis is a proposed explanation for an observation.

Sample Problem

25. 24 minutes → 6 blocks x 1 mile/10 blocks = 0.6 miles x 20 minutes/mile = 12 minutes x 2 (round trip)

26. 24 blocks → 48 minutes x 1 mile/20 minutes = 2.4 miles x 10 blocks/mile

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29. Develop a plan and implement the plan.

30. The three steps are analyze, calculate, and evaluate.

31. analyze and solve

32. In both cases, the solver analyzes the problem, makes a plan, and carries out the plan. Problems with numeric answers require that the answers be evaluated to see if they are reasonable.

33. **a.** known: 3600 s = 1 h; unknown: ? s = 1 day

b. 24 h = 1 day

c. 3600 s/h × 24 h/day = 86,400 s/day

d. 86,400 seconds in one day seems reasonable in relationship to 3600 seconds in one hour. The answer has the correct units, and the relationship used is correct.