

CHAPTER

12

DIRECTED READING WORKSHEET

## Introduction to Atoms

As you read Chapter 12, which begins on page 302 of your textbook, answer the following questions.

### Would You Believe . . . ? (p. 302)

1. What do dinosaurs have in common with atoms?

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2. How did scientists find information that caused them to change their theory about the way *T. rex* walked? (Circle all that apply.)

- a. by studying well-preserved dinosaur tracks
- b. by examining similarities between the skeletons of *T. rex* and an ostrich
- c. by observing a *T. rex* as it was walking
- d. by extracting DNA from fossilized mosquitoes

3. Scientists are able to develop theories about dinosaurs and atoms only through \_\_\_\_\_ evidence.  
(direct or indirect)

### What Do You Think? (p. 303)

Answer these questions in your ScienceLog now. Then later, you'll have a chance to revise your answers based on what you've learned.

### Investigate! (p. 303)

4. How do you think rolling marbles in this activity will help you identify the mystery object?

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Chapter 12, continued

**Section 1: Development of the Atomic Theory** (p. 304)

- 5. Atoms are NOT
  - a. a relatively new idea to us.
  - b. the building blocks of all matter.
  - c. the smallest particles into which an element can be divided and still be the same substance.
  - d. seen with the scanning tunneling microscope.
- 6. An explanation that is supported by testing and brings together a broad range of hypotheses and observations is called a \_\_\_\_\_.

**Democritus Proposes the Atom** (p. 304)

- 7. The word *atom* comes from a Greek word that means \_\_\_\_\_, (invisible or indivisible)
- 8. Which of the following statements is part of Democritus’s theory about atoms?
  - a. Atoms are small, soft particles.
  - b. Atoms are always standing still.
  - c. Atoms join together to form different materials.
  - d. None of the above
- 9. We know that Democritus was right about atoms. So why did people ignore Democritus’s ideas for such a long time?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Dalton Creates an Atomic Theory Based on Experiments** (p. 305)

- 10. By conducting experiments and making observations, Dalton figured out that elements combine in random proportions because they’re made of individual atoms. True or False? (Circle one.)
- 11. Dalton’s theory states that atoms cannot be \_\_\_\_\_, \_\_\_\_\_, or \_\_\_\_\_.
- 12. Atoms of different elements are exactly alike. True or False? (Circle one.)

Chapter 12, continued

13. How did Dalton think atoms formed new substances?

\_\_\_\_\_

\_\_\_\_\_

**Thomson Finds Electrons in the Atom** (p. 306)

Mark the following statements *True* or *False*.

14. \_\_\_\_\_ In 1897, J. J. Thomson made a discovery that proved the first part of Dalton's atomic theory was correct.
15. \_\_\_\_\_ Thomson discovered that there were small particles inside the atom.
16. \_\_\_\_\_ Thomson found that the electrically charged plates affected the direction of a cathode-ray tube beam.
17. \_\_\_\_\_ Thomson knew the beam was made of particles with a positive charge because it was pulled toward a positive charge.
18. When you rub a balloon on your hair, your hair is \_\_\_\_\_ to the balloon because both the hair and the balloon have become \_\_\_\_\_.
19. The two types of charges are positive and neutral.  
True or False? (Circle one.)
20. Objects with the same charges attract each other. True or False? (Circle one.)
21. In Thomson's "plum-pudding" model, electrons are NOT
- a. negatively charged.
  - b. present in every type of atom.
  - c. collected together in the center of the atom.
  - d. scattered throughout a blob of positively charged material.

**Review** (p. 307)

Now that you've finished the first part of Section 1, review what you learned by answering the Review questions in your ScienceLog.

**Rutherford Opens an Atomic "Shooting Gallery"** (p. 308)

22. Before his experiment, Rutherford expected the particles to deflect to the sides of the gold foil. True or False? (Circle one.)

**Chapter 12, continued**

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**23.** Figure 6 shows the new atomic model resulting from Rutherford’s experiment. Which of the following statements is NOT part of Rutherford’s revision of his former teacher’s atomic theory?

- a. Atoms are made mostly of empty space.
- b. The nucleus is a dense, charged center of the atom.
- c. Lightweight, negative electrons move in the nucleus.
- d. Most of an atom’s mass is in the nucleus.

**24.** The diameter of the nucleus of an atom is

\_\_\_\_\_ times smaller than the diameter of the atom.

**Bohr States That Electrons Can Jump Between Levels** (p. 310)

**25.** In Bohr’s atomic model, \_\_\_\_\_ travel in definite paths around the \_\_\_\_\_ at specific levels. Each level is a certain \_\_\_\_\_ from the nucleus. Electrons cannot travel between levels, but they can \_\_\_\_\_ from level to level.

**26.** Bohr’s model only predicted some atomic behavior.

True or False? (Circle one.)

**The Modern Theory: Electron Clouds Surround the Nucleus** (p. 310)

**27.** The exact path of a moving electron can now be predicted.

True or False? (Circle one.)

**28.** What are electron clouds?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Review** (p. 310)

Now that you’ve finished Section 1, review what you learned by answering the Review questions in your ScienceLog.