Chapter One Golden Ticket Name_____

About Science

Key Terms and Matching Definitions

_____ fact _____ science _____ hypothesis

_____ law _____ scientific method _____ theory

_____ technology _____ pseudoscience

1. Organized common sense. Also the collective findings of humans about nature, and a process of gathering and organizing knowledge about nature.
2. An orderly method for gaining, organizing, and applying new knowledge.
3. An educated guess; a reasonable explanation that is not fully accepted as factual until tested over and over again by experiment.
4. A phenomenon about which competent observers can agree.
5. A general hypothesis or statement about the relationship of natural quantities that has been tested over and over again and has not been contradicted. Also known as a *principle.*
6. A synthesis of a large body of information that encompasses well-tested hypotheses about certain aspects of the natural world.
7. Fake science that has no tests for its validity.
8. Method and means of solving practical problems by applying the findings of science.

Review Questions

1.1 A Brief History of Advances in Science

1. What is science? (Name two major aspects of science that are discussed in the first paragraphs of this chapter.)

2. What discovery in the 15th century greatly advanced progress in science?

3. Throughout the ages, has acceptance or resistance usually been the general reaction to new ideas about established “truths”?

1.2 Mathematics and Conceptual Physical Science

4. When was the mathematical structure of science discovered?

5. Why is mathematical problem solving not a major feature of this book?

1.3 The Scientific Method–A Classic Tool

6. Outline the steps of the scientific method.

7. Distinguish among a scientific fact, a hypothesis, a law, and a theory.

1.4 Scientific Hypotheses

8. What is the hallmark of a scientific hypothesis?

9. How many experiments are necessary to invalidate a scientific hypothesis?

1.5 A Scientific Attitude Underlies Good Science

10. In science, what kind of ideas are generally accepted?

11. Why is honesty a matter of self-interest to a scientist?

1.6 Science Has Limitations

12. What is meant by the term supernatural, and why does science not deal with it?

1.7 The Search for Order–Science, Art, and Religion

13. How are science and the arts similar?

14. Why are students of the arts encouraged to learn about science and science students encouraged to learn about the arts?

15. Why do many people believe they must choose between science and religion?

16. How do scientists regard “not knowing” in general?

1.8 Technology–Practical Use of the Findings of Science

17. Clearly distinguish between science and technology.

1.9 The Physical Sciences: Physics, Chemistry, Geology, and Astronomy

18. Cite at least two examples of the physical sciences, and two from the life sciences.

1.10 In Perspective

19. How does the material in this section relate to the opening photo on page 1 of this book?

Exercises

1. In daily life, people are often praised for maintaining some particular point of view, for the "courage of their convictions." A change of mind is seen as a sign of weakness. How is this different in science?

2. Which of the following are scientific hypotheses?
   a. Chlorophyll makes grass green.

   b. The Earth rotates about its axis because living things need an alternation of light and darkness.

   c. Tides are caused by the moon

3. In answer to the question, "When a plant grows, where does the material come from?" Aristotle hypothesized by logic that all material came from the soil. Do you consider his hypothesis to be correct, incorrect, or partially correct? What experiments do you propose to support your choice?

4. What is probably being misunderstood by a person who says, "But that's only a scientific theory"?

6. Make an argument for bringing to a halt the advances of technology.

7. Make an argument that advances in technology should continue.