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Chapter 1 Science Skills

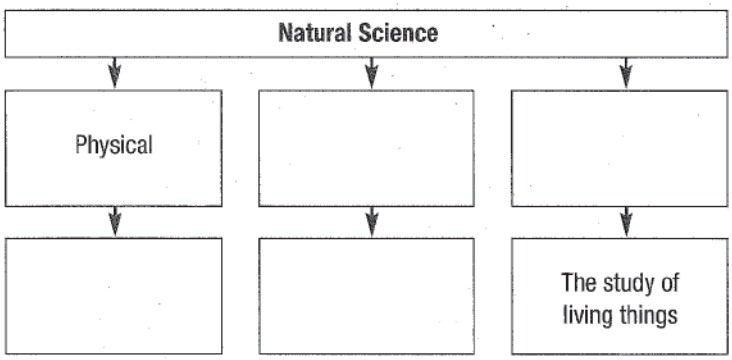
Section 1.1 What Is Science?

(pages 2–6)

This section describes the characteristics of science and technology. It also discusses the big ideas of physical science.

Reading Strategy (page 2)

Previewing Skim the section to find out what the main branches of natural science are. Complete the concept map based on what you have learned. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



Science From Curiosity (pages 2–3)

1. Define science. _____

_____

2. The questions that lead to scientific discovery are provided by _____.

3. Is the following sentence true or false? The results of every scientific experiment are quantitative. _____

Science and Technology (page 3)

4. Is the following sentence true or false? The use of knowledge to solve practical problems is known as curiosity. _____

5. How are science and technology related? _____

_____

Branches of Science (page 4)

6. Name the two general categories that the study of science can be divided into.

   a. _____ b. _____

7. Circle the letters of each branch of natural science.

   a. physical science b. Earth and space science

   c. social science d. life science

8. Circle the letter of each sentence that is true about the field of chemistry.
   a. Chemists study reactions involving matter.
   b. Chemists study the composition of matter.
   c. Chemists study the structure of matter.
   d. Chemists study the properties of matter.
9. The study of matter, energy, and the interactions between the two through forces and motion is known as _____.
10. Identify the topics that are included in the science of geology.

    _____

    _____

11. Is the following sentence true or false? The foundation of space science is astronomy. _____
12. Scientists who study the origin and behavior of living things are called biologists, and the study of living things is known as _____.

The Big Ideas of Physical Science (pages 5–6)

13. Is the following sentence true or false? All of the important rules of nature have already been discovered. _____
14. Circle the letter of each sentence that is true about the diameter of the observable universe.
    a. It is one hundred million meters.
    b. It is seven hundred billion meters.
    c. It is seven hundred million billion meters.
    d. It is seven hundred million billion billion meters.
15. Name the two characteristics of matter.
    a. _____
    b. _____
16. The basic building blocks of matter are called _____.
17. Is the following sentence true or false? A force causes a change in time. _____
18. Describe kinetic energy. _____

    _____

19. Two general types of energy are kinetic energy and _____ energy.

Science and Your Perspective (page 6)

20. Is the following sentence true or false? The scientific facts of today will not change in the future. _____

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Chapter 1 Science Skills

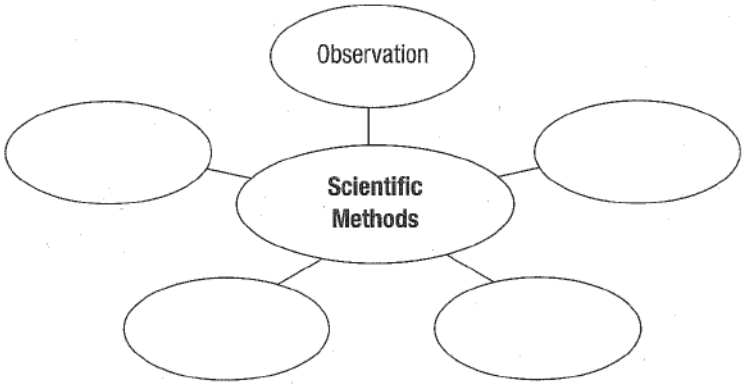
Section 1.2 Using a Scientific Approach

(pages 7–11)

This section describes scientific methods and how they are used to understand the world around you.

Reading Strategy (page 7)

Using Prior Knowledge Before you read, add to the web diagram what you already know about scientific methods. After you read the section, revise the diagram based on what you have learned. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.



Scientific Methods (pages 7–9)

1. Identify the goal of any scientific method. _____

_____

2. Name three types of variables in an experiment.

   a. _____ b. _____ c. _____

3. Is the following sentence true or false? If the data from an experiment do not support your hypothesis, you can revise the hypothesis or propose a new one. _____

4. How does a scientific theory differ from a hypothesis? _____

_____

Match the following vocabulary terms to the correct definition.

	Definition	Vocabulary Terms
_____	5. Information that you obtain through your senses	a. theory
_____	6. A well-tested explanation for a set of observations	b. hypothesis
_____	7. A proposed answer to a question	c. observation

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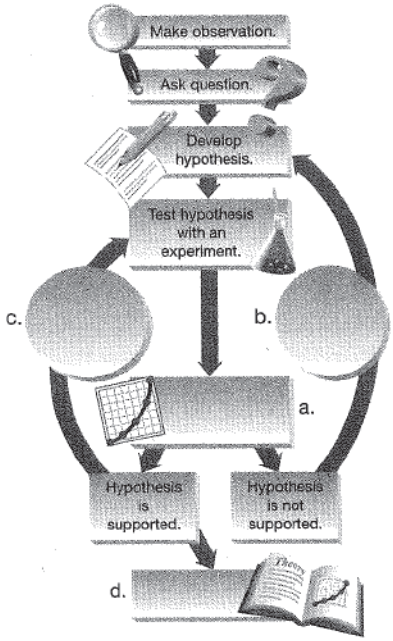

8. Complete the model of a scientific method by filling in the missing steps.

   a. _____ b. _____

   c. _____ d. _____

Scientific Laws (page 9)

9. Is the following sentence true or false? A scientific law attempts to explain an observed pattern in nature. _____

10. All scientists may accept a given scientific law, but different scientists may have different _____ to explain it.

Scientific Models (page 10)

11. Why do scientists use scientific models? _____

    _____

12. Circle the letters that correctly state what scientists do if data show that a model is wrong.

    a. Change the model. b. Replace the model.

    c. Ignore the data. d. Revise the data.

Working Safely in Science (page 11)

13. Circle the letters of safety precautions to follow whenever you work in a science laboratory.

    a. Study safety rules. b. Never ask questions.

    c. Read all procedural steps. d. Understand the procedure.

14. Why should you wash your hands after every experiment? _____

    _____

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Chapter 1 Science Skills

Section 1.3 Measurement

(pages 14–20)

This section discusses units of measurement, making and evaluating measurements, and calculations with measurements.

Reading Strategy (page 14)

Previewing Before you read the section, rewrite the green and blue topic headings in this section as questions in the table below. As you read, write answers to the questions. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Measurement
Why is scientific notation useful?

Using Scientific Notation (pages 14–15)

1. Scientific notation expresses a value as the product of a number between 1 and 10 and _____.
2. Circle the letter of the value that is expressed as 3×10^8.
   a. 300 b. 300,000
   c. 30,000,000 d. 300,000,000
3. Why is scientific notation useful? _____

SI Units of Measurement (pages 16–18)

4. Circle the letters of elements that are required for a measurement to make sense.
   a. scientific notation b. numbers
   c. exponents d. units
5. Is the following sentence true or false? Units in the SI system include feet, pounds, and degrees Fahrenheit. _____

Match the SI base unit with the quantity that is used to measure.

SI Base Unit	Quantity
_____ 6. meter	a. Mass
_____ 7. kilogram	b. Time
_____ 8. kelvin	c. Length
_____ 9. second	d. Temperature

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SI Prefixes			
Prefix	**Symbol**	**Meaning**	**Multiply Unit By**
giga-	G		1,000,000,000
mega-	M	million (10^6)	
kilo-	k	thousand (10^3)	1000
deci-	d		0.1
centi-		hundredth (10^{-2})	0.01
	m	thousandth (10^{-3})	0.001
	μ	millionth (10^{-6})	0.000001
nano-		billionth (10^{-9})	0.000000001

10. Complete the table of SI prefixes by filling in the missing information.
11. A ratio of equivalent measurements that is used to convert a quantity expressed in one unit to another unit is called a(n) _____.

Limits of Measurement (page 19)

12. Circle the letter of each expression that has four significant figures.
    a. 1.25×10^4 b. 12.51
    c. 0.0125 d. 0.1255
13. Is the following sentence true or false? The precision of a calculated answer is limited by the least precise measurement used in the calculation. _____
14. Calculate the density if the mass of a solid material is measured as 15.00 grams and its volume is measured as 5.0 cm^3? Round off your answer to the proper number of significant figures.

    _____
15. Describe the difference between precision and accuracy. _____

    _____

    _____

Measuring Temperature (page 20)

16. Circle the letter of the base unit of temperature in SI.
    a. degree Fahrenheit (°F) b. degree Celsius (°C)
    c. candela (cd) d. kelvin (K)
17. Write the formula used to convert degrees Celsius to kelvins.

    _____

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Chapter 1 Science Skills

Section 1.4 Presenting Scientific Data

(pages 22–25)

This section describes how scientists organize and communicate data.

Reading Strategy (page 22)

Comparing and Contrasting After you read this section, compare the types of graphs by completing the table. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

Type of Graph	Description	Used For
Line graph		
Bar graph		
Circle graph		

Organizing Data (pages 22–24)

1. Circle the letters of tools that scientists use to organize their data.
   a. the Internet b. newspapers
   c. tables d. graphs
2. The simplest way to organize data is to present them in a(n) _____.
3. Circle the letter of the place on a line graph where the manipulated variable is generally plotted.
   a. the *y*-axis b. the rise
   c. the *x*-axis d. the run
4. On a line graph, the ratio of the change in the *y*-variable to the corresponding change in the *x*-variable is called the line's _____.
5. Circle the letters of the relationships that are direct proportions.
   a. distance traveled versus time at a constant speed
   b. the mass of a substance versus its volume
   c. the time to travel a given distance versus average speed
   d. the number of fingers in your classroom versus the number of people

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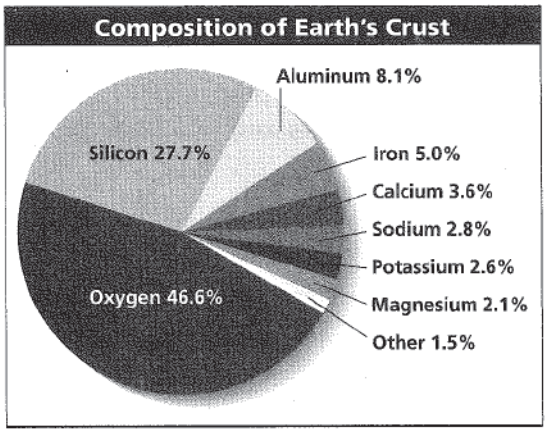
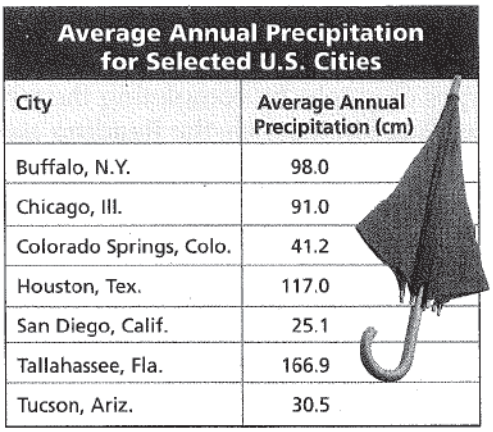
6. Is the following sentence true or false? An inverse proportion is one in which the product of the two variables is constant.

_____

7. Identify each data organizing tool shown below.



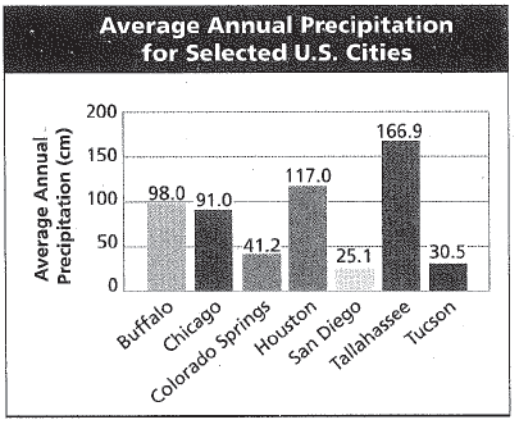
a.



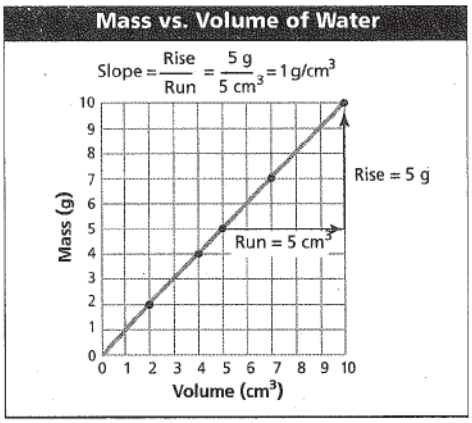
Average Annual Precipitation for Selected U.S. Cities

City	Average Annual Precipitation (cm)
Buffalo, N.Y.	98.0
Chicago, Ill.	91.0
Colorado Springs, Colo.	41.2
Houston, Tex.	117.0
San Diego, Calif.	25.1
Tallahassee, Fla.	166.9
Tucson, Ariz.	30.5

b.



c.



d.

a. _____ b. _____

c. _____ d. _____

Communicating Data (page 25)

8. Name two ways that scientists can report results of their experiments.

a. _____ b. _____

9. Is the following statement true or false? Scientists always interpret a given set of data the same way. _____

10. Why is peer review an important part of scientific research? _____

_____