

Measurement—A Common Language

Due Date: _____

Key Concepts

- Why do scientists use a standard measurement system?
- What are the SI units of measure for length, mass, volume, density, time, and temperature?
- How are conversion factors useful?

The **metric system** is a system of measurement based on the number 10. Modern scientists use a version of the metric system called the International System of Units, abbreviated as **SI**. Using **SI** as the standard system of measurement allows scientists to compare data and communicate with each other about their results. SI units are based on multiples of 10.

The **basic unit of length in the SI system is the meter (m)**. To measure objects smaller than a meter, scientists use units called the centimeter (cm) or millimeter (mm). There are 1,000 meters in a kilometer.

Mass is a measure of the amount of matter an object contains. The **basic unit of mass in the SI system is the kilogram (kg)**. There are 1,000 grams in a kilogram and 1,000 milligrams in one gram. **Weight** is a measure of the force of gravity acting on an object.

Volume is the amount of space an object takes up. To measure the volume of a liquid, scientists use a unit known as the liter (L). There are 1,000 milliliters in a liter. To determine the volume of a solid object, scientists use a unit known as the cubic centimeter (cm^3). One cubic centimeter is exactly equal to one milliliter. **For solids with larger volumes, scientists use the SI unit known as the cubic meter (m^3)**. To calculate the volume of a rectangular solid, use this formula: $\text{Volume} = \text{Length} \times \text{Width} \times \text{Height}$. To measure the volume of an irregular solid, immerse the object in water and measure how much the water level rises.

Use Target Reading Skills

As you read, compare and contrast different types of measurements by completing the table below.

Measurement

Characteristic	Length	Mass	Volume
Definition	35.	36.	37.
SI Unit	38.	39.	40.
Measuring Tool	41.	42.	43.

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Measurement—A Common Language (continued)**A Standard Measurement System** (p. 45)

1. What is the metric system?

2. Modern scientists use a version of the metric system called the _____, abbreviated _____.
3. Circle the letter of each advantage of using SI as the standard system of measurements.
 - a. Using SI allows scientists to compare data.
 - b. Every country can have its own system.
 - c. All units are expressed in the French language.
 - d. Scientists can communicate with each other about their results.
4. SI units are based on multiples of _____.

Match the SI prefix with its meaning by writing the letter of the meaning in the correct blank.

- | | |
|------------------|---------------------------|
| _____ 5. hecto- | a. 1,000 |
| | b. 100 |
| _____ 6. deci- | c. 10 |
| | d. 0.1 (one tenth) |
| _____ 7. milli- | e. 0.01 (one hundredth) |
| _____ 8. kilo- | f. 0.001 (one thousandth) |
| _____ 9. deka- | |
| _____ 10. centi- | |

11. Is the following sentence true or false? Each SI unit is 10 times smaller than the next smallest unit. _____

Length (pp. 46–48)

12. What is length?

13. The basic unit of length in the SI system is the _____.

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14. Which of the following sentences are true about meter measurements?
 - a. Most 13-years old are between 1.5 and 2 centimeters tall.
 - b. The distance from the floor to a common doorknob is about 1 meter.
 - c. The ceiling in your classroom is about 1 meter above the floor.
 - d. Your arm is about 20 meters long.
15. One meter equals _____ centimeters.
16. Circle the letter of a common tool used to measure metric length.
 - a. metric balance
 - b. metric ruler
 - c. graduated cylinder
 - d. kelvin

Mass (pp. 48–49)

17. What is mass?

18. The basic unit of mass in the SI system is the _____.
19. 1 kilogram = 1,000 _____.
20. A device that works by comparing the mass of an object to a known mass is called a(n) _____.
21. Circle the letter of the best definition of weight.
 - a. A measure of the amount of matter an object contains
 - b. A measure of the amount of space an object takes up
 - c. A measure of the force of gravity acting on an object
 - d. A measure of how much mass is contained in a given volume

Volume (pp. 50–51)

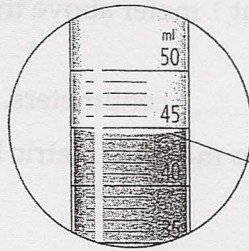
22. What is volume?

23. The tool that scientists commonly use to measure liquid volume is the _____.
24. 1 _____ = 1,000 milliliters

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Measurement—A Common Language (continued)

25. What does the line point to? Write your answer in the space provided.



26. Circle the letter of each unit that can be used to measure the volume of a solid object.

- a. cubic meter (m^3)
- b. cubic gram (g^3)
- c. liter (L)
- d. cubic centimeter (cm^3)

27. What is the formula used to calculate the volume of a rectangular solid?

28. Is the following sentence true or false? One method used to measure the volume of an irregular solid involves immersing the object in water. _____

Building Vocabulary

Fill in the blank to complete each statement.

- 29 Modern scientists use a version of the metric system called the International System of Units, abbreviated as _____.
- 30 The measure of the force of gravity acting on an object is called _____.
- 31 The _____ system is a system of measurement based on the number 10.
- 32 The amount of space an object takes up is called _____.
- 33 The curve of the top surface of water in a graduated cylinder is called the _____.
- 34 The measure of the amount of matter an object contains is called _____.