

3.2

THE INTERNATIONAL SYSTEM OF UNITS

Section Review

Objectives

- List SI units of measurement and common SI prefixes
- Distinguish between the mass and weight of an object
- Convert between Celsius and Kelvin temperature scales

Vocabulary

- International System of Units (SI)
- meter (m)
- liter (L)
- weight
- kilogram (kg)
- gram (g)
- temperature
- Celsius scale
- Kelvin scale
- absolute zero
- energy
- joule (J)
- calorie (cal)

Part A Completion

Use this completion exercise to check your understanding of the concepts and terms that are introduced in this section. Each blank can be completed with a term, short phrase, or number.

The International System of Units (SI) is a revision of the _____
 _____¹ system. There are _____² SI base units. In SI, the base
 unit of length is the _____³.

The space taken up by a cube that is 10 cm on each edge is
 one _____⁴. A measure of the pull of gravity on an object of
 given mass is its _____⁵. The mass of one cubic centimeter of
 water at 4°C is one _____⁶. Scientists commonly use two
 equivalent units of temperature, the degree _____⁷ and the
 _____⁸. The _____⁹ and the _____¹⁰ are common units of energy.

1. metric
2. seven
3. meter
4. liter
5. weight
6. gram
7. Celsius
8. Kelvin
9. joule/calorie
10. calorie/joule

Part B True-False

Classify each of these statements as always true, AT; sometimes true, ST; or never true, NT.

- NT 11. The SI base unit of mass is the milliliter.
- NT 12. A decigram is 100 times smaller than a gram.
- AT 13. The SI unit of volume is derived from the unit of length.
- NT 14. There are six basic SI units of measurement.

Part C Matching

Match each description in Column B to the correct term in Column A.

Column A

- K 15. Kelvin scale
- e 16. International System of Units (SI)
- m 17. temperature
- g 18. meter
- a 19. calorie
- I 20. Celsius scale
- d 21. liter
- c 22. joule
- n 23. weight
- u 24. absolute zero
- j 25. kilogram
- f 26. gram
- b 27. energy

Column B

- a. quantity of heat that raises the temperature of 1 g of pure water by 1°C.
- b. the capacity to do work or to produce heat
- c. the SI unit of energy
- d. non-SI unit of volume
- e. standardized system of measurement based on the metric system
- f. mass unit commonly used in chemistry
- g. the SI unit of length
- h. force that measures the pull of gravity on a given mass
- i. zero point on the Kelvin scale equal to -273.15°C
- j. SI base unit of mass
- k. temperature scale on which the freezing point of water is 273.15° and its boiling point is 373.15°
- l. temperature scale that sets the freezing point of water at 0° and its boiling point at 100°
- m. measure of how hot or cold an object is

Part D Questions and Problems

Answer the following in the space provided.

28. What is the volume of a board that measures 1.8 cm by 8.8 cm by 30.5 cm?

$$\text{Vol} = \frac{1.8}{\text{cm}} \times 8.8 \text{ cm} \times 30.5 \text{ cm} = 4.8 \times 10^2 \text{ cm}^3$$

29. Hydrogen boils at 20K. What is the boiling point of hydrogen on the Celsius scale?

$$^{\circ}\text{C} = \text{K} - 273 = 20 - 273 = -253^{\circ}\text{C}$$

30. What is the symbol and meaning of each prefix?

a. *pico-* 10^{-12} p

b. *kilo-* 10^3 k

c. *micro-* 10^{-6} μ

d. *centi-* 10^{-2} c

a. p, 10^{-12}

b. K, 10^3

c. μ , 10^{-6}

d. c, 10^{-2}