Dimensional Analysis & Unit Conversions

INSTRUCTOR / SELF-STUDY ANSWER KEY

Answers and reasoning appear in red. Use these to discuss why incorrect choices are incorrect.

Part A — Concept checks

1. **How many centimeters are in 1.20 m?**

   Answer: B. 120 cm — 1.20 m × 100 cm/m = 120 cm.

2. **Which conversion factor cancels hours when converting hours to minutes?**

   Answer: B. 60 min / 1 h — Hours must appear in the denominator.

3. **0.0750 L equals how many milliliters?**

   Answer: B. 75.0 mL — Multiply liters by 1000 mL/L.

4. **A sample has density 2.0 g/mL. What is the mass of 3.0 mL?**

   Answer: C. 6.0 g — Density × volume = 2.0 × 3.0 = 6.0 g.

5. **Which unit should remain after converting 4.0 mol using 18.0 g/mol?**

   Answer: B. g — mol × g/mol leaves g.

6. **2500 mm equals how many meters?**

   Answer: B. 2.5 m — 2500 mm × 1 m/1000 mm = 2.5 m.

Part B — Application and explanation

7. Convert 2.50 km to meters.

   Model solution: 2.50 km × (1000 m / 1 km) = 2.50×10^3 m. The km units cancel and three significant figures are retained. Final answer: 2.50×10^3 m

8. Explain why this guideline matters, with an example of what could go wrong if you ignore it: A unit conversion changes the numerical value and the unit; it does not change the actual physical amount.

   Model explanation: A unit conversion changes the numerical value and the unit; it does not change the actual physical amount. Example/check: A conversion factor is a ratio equal to one. Write the given unit first; place that unit in the denominator of your factor so it cancels.

REFERENCE RELATIONSHIP

given quantity × (desired unit / given unit) = converted quantity