LESSON MAKER PRO

Units That Cancel

Convert measurements and report meaningful digits.

HIGH SCHOOL · CHE.1

CHE.1 "Students will use mathematical and computational analysis to evaluate problems. Use dimensional analysis (factor/label) and significant figures to convert units and solve problems..."

NAME _____ DATE _____

FACTOR AND LABEL

Multiply by a conversion ratio that equals 1, placing units so the units you do not want cancel. For multiplication or division, round your answer to the fewest significant figures in the measured values. Defined unit conversions and counted objects are exact.

WORKED EXAMPLE

Convert 4.50 m to cm. Use 1 m = 100 cm exactly.

1. Set up the ratio: 4.50 m × (100 cm/1 m).
2. Cancel m: 4.50 × 100 cm = 450 cm.
3. Keep 3 significant figures: 4.50×10^2 cm.

Answer: 4.50×10^2 cm

PRACTICE 6 problems

1 Convert 2.5 min to s. Use 1 min = 60 s exactly. Report the correct significant figures.

ANSWER _____

2 Convert 750. mg to g. Use 1000 mg = 1 g exactly. Report the correct significant figures.

ANSWER _____

3 Convert 0.060 L to mL. Use 1 L = 1000 mL exactly. Report the correct significant figures.

ANSWER _____

4 A sample has a mass of 12.0 g and a volume of 4.0 mL. Find its density in g/mL. Report the correct significant figures.

ANSWER _____

5 Convert 8.0 cm to mm. Use 1 cm = 10 mm exactly. Report the correct significant figures.

ANSWER _____

6 Convert 2.40 g to mg. Use 1 g = 1000 mg exactly. Report the correct significant figures.

ANSWER _____

APPLY IT Show your work

1 Your reusable water bottle holds 0.750 L. How many mL does it hold? Use 1 L = 1000 mL exactly, and report the correct significant figures.

WORK SPACE

ANSWER _____

2 A sports drink label lists 240. mg of sodium per bottle. You drink 2 bottles. How many grams of sodium is that? Treat the bottle count as exact, use 1000 mg = 1 g exactly, and report the correct significant figures.

WORK SPACE

ANSWER _____

CHALLENGE One step up

A solution contains 0.200 g of solute per 80.0 mL. You combine 25.0 mL and 15.0 mL of this solution. How many mg of solute are in the combined portion? Show a factor/label setup and report the correct significant figures. Use 1 g = 1000 mg exactly.

WORK SPACE AND ANSWER

Units That Cancel

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Convert 2.5 min to s. Use 1 min = 60 s exactly. Report the correct significant figures.	**1.5×10^2 s**
2	Convert 750. mg to g. Use 1000 mg = 1 g exactly. Report the correct significant figures.	**0.750 g**
3	Convert 0.060 L to mL. Use 1 L = 1000 mL exactly. Report the correct significant figures.	**6.0×10^1 mL**
4	A sample has a mass of 12.0 g and a volume of 4.0 mL. Find its density in g/mL. Report the correct significant figures.	**3.0 g/mL**
5	Convert 8.0 cm to mm. Use 1 cm = 10 mm exactly. Report the correct significant figures.	**8.0×10^1 mm**
6	Convert 2.40 g to mg. Use 1 g = 1000 mg exactly. Report the correct significant figures.	**2.40×10^3 mg**

PART 2 · APPLY IT

1. **7.50×10^2 mL** Multiply 0.750 L by 1000 mL/1 L. The measured volume has 3 significant figures.
2. **0.480 g** Multiply 240. mg/bottle by 2 bottles, then by 1 g/1000 mg. The label value has 3 significant figures.

CHALLENGE

25.0 mL + 15.0 mL = 40.0 mL; 40.0 mL × (0.200 g/80.0 mL) × (1000 mg/1 g) = 1.00×10^2 mg.

Accept equivalent forms that make the required significant figures clear, such as 60. mL for 6.0×10^1 mL. The challenge result has 3 significant figures.