

HOW TO SOLVE DIMENSIONAL ANALYSIS (aka CONVERSION FACTOR) PROBLEMS

Follow these steps:

1. Use the information in the problem to determine what the “given” quantity is and what quantity you are looking for (the “unknown”).
2. Set up the problem.

a. Given quantity x $\frac{\boxed{\text{unknown unit}}}{\boxed{\text{given unit}}}$ = Unknown quantity

↑
CONVERSION FACTOR

3. Figure out the conversion factor needed to go from the given unit to the unknown unit (it might take more than one step!).

How do you figure this out?? (We’ve already practiced this some...)

- a. You need to know the relationship between the unit you are given and the one you are looking for. *A trick to help you: the bigger unit will always have be “1” because it makes more sense to have many small things in one big thing, right?!*

1 gram = 1000 milligrams

___ kilometer = ___ meters

- b. Then make the appropriate conversion factor out of it (so turn the equality into fraction form).

$$\frac{1 \text{ gram}}{1000 \text{ milligrams}}$$

OR

$$\frac{1000 \text{ milligrams}}{1 \text{ grams}}$$

4. Remember that the unit of the “given” should be on the bottom of the conversion factor so it cancels and the unit of the “unknown” should be on the top.
5. Calculate.
6. Do a quick check of your answer: Does the unit you are left in match the one asked for in the problem? Is your answer reasonable?
7. Always show your work and box your final answer!!!!

Here are a few examples we can do together.

a. 10.5 g = _____ kg

b. 1.57 km = _____ m

c. $3.54 \mu\text{g} = \underline{\hspace{2cm}} \text{g}$

d. $3.5 \text{ mol} = \underline{\hspace{2cm}} \mu\text{mol}$

e. $1.2 \text{ L} = \underline{\hspace{2cm}} \text{mL}$

f. $358 \text{ cm}^3 = \underline{\hspace{2cm}} \text{m}^3$

g. $548.6 \text{ mL} = \underline{\hspace{2cm}} \text{cm}^3$