

## How to solve a word problem, especially in chemistry.

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First, you want to list (and sometimes summarize) the information that you know (from the problem), and list what you want to know (the answer). Sometimes a picture may help. I will use an example from your Chapter 1 Homework to help explain. Essentially, you have a 19 pound (lb.) baby that needs a medicine, and you need to figure out how much medicine to give the baby. The medicine is 100mg/5.0mL. Imagine what this means: 100 mg of the medicine is dissolved in a liquid (usually water), so that the total volume is 5.0 mL. The dose that the baby needs is 10 mg/kg of the baby's body weight. (The problem asked that the answer have 2 significant figures.) I would summarize:

a) 19 lbs. baby = body weight

b)  $\frac{100 \text{ mg of medicine}}{5.0 \text{ mL}}$

c) dose is  $\frac{10 \text{ mg medicine}}{1 \text{ kg body weight}}$

d) want to know: \_\_\_\_\_ mL to give the baby

(You do not need to write the "a)" or "b)", etc. I needed to identify each piece of information.) You can treat the information in line b) and line c) as "conversion factors", therefore, you can write them as:

b)  $\frac{100 \text{ mg medicine}}{5.0 \text{ mL mixture of medicine plus liquid}}$  OR  $\frac{5.0 \text{ mL mixture}}{100 \text{ mg medicine}}$

c)  $\frac{10 \text{ mg medicine}}{1 \text{ kg body weight}}$  OR  $\frac{1 \text{ kg body weight}}{10 \text{ mg medicine}}$

Usually you want to start with the 19 lbs. because it is one number with one unit, and the answer you want is one number with one unit. The only other place that body weight is written is in the conversion factor in part c), and the unit there is kg. So, we first must convert the unit lbs. to kg. You will have to look up (in textbook or lecture notes) that: 1 kg = 2.20 lbs. Like any

conversion factor, you can write this as  $\frac{1 \text{ kg}}{2.20 \text{ lbs.}}$  OR  $\frac{2.20 \text{ lbs.}}{1 \text{ kg}}$ . So, we use the first

version of this conversion factor:

$$19 \text{ lbs.} \left( \frac{1 \text{ kg}}{2.20 \text{ lbs.}} \right) = 8.6363 \text{ kg} \quad , \quad \text{notice the unit lbs. cancels, or } \frac{\text{lbs.}}{\text{lbs.}} = 1$$

\*\*\*Use the conversion factor that cancels the original units.

Next, use the conversion factor in part c):

$$8.6363 \text{ kg} \left( \frac{10 \text{ mg medicine}}{1 \text{ kg body weight}} \right) = 86.363 \text{ mg medicine}$$

Finally, we can use the conversion factor in part b):

$$86.363 \text{ mg medicine} \left( \frac{5.0 \text{ mL}}{100 \text{ mg}} \right) = 4.3182 \text{ mL} = 4.3 \text{ mL}$$

Hope this helps!