Name: _____ Section: _____

US CONVERSION STEPS

"Dimensional Analysis"

1. Read the question to figure out what you have/know for information. The question will provide you with information that identifies your starting point and your final destination.

<u>Starting point</u> = the number and unit provided by the question
<u>Final destination</u> = the units desired after converting

2. Using the information gathered from the question, write your starting point and your final destination.
3. Determine the means in which you will get from your starting point to your final destination (simply find "connections" or conversion factors between your starting and final unit).
4. Create a fraction by placing your starting point over one.
5. Multiply between fractions.
6. Write in the bottom unit of the new fraction. This should be the same as the top unit of the previous fraction.
7. Write one set of "connections" or conversion factors into the fraction. *Your bottom unit will guide you.*
8. Ask yourself, "Do I have the desired unit (final destination) on the top of the new fraction?"

Go back to step 5

NO

YES

Proceed to step 9

9. Cancel any units that are diagonal. (This should leave you with only the units that represent your final destination)
10. Multiply the top of the fractions…multiply the bottom of the fractions…divide the top by the bottom.

<u>ALWAYS</u> include the units as you work your problems. The units will help you decide how to place the conversion factors. Your goal is to set up the problem so that the units you don't want are cancelled out, and the units you have been asked for are in the final answer.

EXAMPLE

- **STEP 1 - Read question and identify any given information**

How many seconds are in 25 hours?

Starting Point = 25 hours
Final Destination = seconds

- **STEP 2 – Write your starting point and your final destination**

25 Hours → seconds

- **STEP 3 – Find "connections" or conversion factors between your starting point and final destination.**

1 hour = 60 minutes
1 minute = 60 seconds

- **STEP 4 – Place your starting point over "1"**

$$\frac{(25\text{ hours})}{(1)}$$

- **STEP 5 – Multiply between fractions**

$$\frac{(25\text{ hours})}{(1)}\ \frac{(\_\_\_\_\_)}{(\quad\quad)}$$

- **STEP 6 – Write in bottom unit of new fraction (same as top unit of previous fraction)**

$$\frac{(25\text{ hours})}{(1)}\ \frac{(\_\_\_\_\_)}{(\quad\text{hours})}$$

- **STEP 7 – Write one set of conversion factors into the fraction.**
  *Since you want to go from hours to seconds, the first conversion factor used is **1 hour = 60 minutes**.*

$$\frac{(25\text{ hours})}{(1)}\ \frac{(60\text{ minutes})}{(1\text{ hour})}$$

- **STEP 8 – Determine if you have the correct units on top of the new fraction**
  *Since the desired unit is not on top, it is necessary to use the second conversion factor (**1 minute = 60 seconds**) prior to moving on. Now that seconds is on top you can move on to STEP 9.*

$$\frac{(25\text{ hours})}{(1)}\ \frac{(60\text{ minutes})}{(1\text{ hour})}\ \frac{(60\text{ seconds})}{(1\text{ minute})}$$

- **STEP 9 – Cancel all units that are diagonal**

$$\frac{(25\ \cancel{\text{hours}})}{(1)}\ \frac{(60\ \cancel{\text{minutes}})}{(1\ \cancel{\text{hour}})}\ \frac{(60\text{ seconds})}{(1\ \cancel{\text{minute}})}$$

- **STEP 10 – Multiply the top…multiply the bottom…divide top by bottom**

$$\frac{(\cancel{25}\text{ hours})}{(1)}\ \frac{(\cancel{60\text{ minutes}})}{(1\ \cancel{\text{hour}})}\ \frac{(60\text{ seconds})}{(1\ \cancel{\text{minute}})} = \frac{(25)(60)(60\text{ secs.})}{(1)(1)(1)} = \mathbf{90{,}000\ secs.}$$