Dim, Analysis Worksheet #2

1 G(base) = 1 000 000 000 (base)
1 M(base) = 1 000 000 (base)
1 k(base) = 1 000 (base)
1 h(base) = 100 (base)
1 da(base) = 10 (base)
1 (base) = 1 (base)
10 d(base) = 1 (base)
100 c(base) = 1 (base)
1000 m (base) = 1 (base)
1 000 000 µ(base) = 1(base)
1 000 000 000 n(base) = 1(base)

Learn to use the table above. To find the relationship to be used as a conversion factor, replace base with any metric unit. (second, meter, gram, liter, etc) Then use the table to write down the relationship.

For example to convert Mm to m, the relationship above is

1 M(base) = 1 000 000 (base)

That becomes

1 Mm = 1 000 000 m

1. Practice- Write the relationships for the following conversions
   a. cm to m  \( \frac{100 \text{ cm}}{\text{m}} \)
   b. m to µm  \( \frac{1,000,000 \text{ mm}}{\text{m}} \)
   c. ns to s  \( \frac{1,000,000,000 \text{ nm}}{\text{m}} \)
   d. kg to g  \( \frac{1 \text{ Kg}}{1000 \text{ g}} \)
   e. L to mL  \( \frac{1 \text{ L}}{1000 \text{ mL}} \)

Turn the relationships into conversion factors. Each of the relationships above can become one of two conversion factors.

\[
1 = \frac{1 \text{ Mm}}{1 000 000 \text{ m}} = \frac{1 000 000 \text{ m}}{\text{Mm}}
\]

2. Practice – Write the two conversion factors for the relationships in a-e above

\[
\frac{1 \text{ m}}{100 \text{ cm}} \quad \frac{1,000,000 \mu \text{m}}{1 \text{ m}}
\]
Use the conversion factors to do conversions. A conversion from cm to m requires one step. You can identify 1 step conversions because only one of the units has a prefix. A conversion from cm to \(\mu m\) requires two steps. You can identify a 2 step conversion because both of the units have a prefix.

To convert from cm to m - use the relationship \(100\, cm = 1\, m\), make the conversion factors

\[
\frac{45\, cm}{100\, cm} = 0.45\, m
\]

- Desired unit is left uncanceled
- Put the unit you want to cancel on the opposite side of the bar
- Multiply by the numbers on the top of the bar and divide by the numbers below the bar

To convert from cm to \(\mu m\) (two steps because there are two prefixes)
- Identify the relationships between cm and m, and between \(\mu m\) and m
  - Find the path you will take to make the conversion (cm to m to \(\mu m\))
  \[
  100\, cm = 1\, m \quad 1000\, 000\, \mu m = 1\, m
  \]
- Insert the relationships into conversion factors
- Insert the conversion factors to cancel the units
- Multiply the top numbers and divide by the bottom numbers

Example

\[
\frac{45\, cm}{100\, cm} \times \frac{1\, m}{1\, m} = 430000\, \mu m
\]

Practice 1 -
- a. convert \(1.52 \times 10^5\) \(\mu s\) to \(\mu\) s (follow the steps above)
- b. convert \(3.51 \times 10^9\) kg to mg
- c. convert \(5.76 \times 10^8\) s to years
- d. convert \(8.553 \times 10^{-2}\) years to seconds

Practice 2 -
- a. convert \(78.4\, g/mL\) to kg/L

Practice 3 -
- a. The density of aluminum is \(2.70\, g/cm^3\). What is the mass in kg of a block of aluminum that measures \(5.00\, cm \times 8.00\, cm \times 3.0\, cm\)