**Problem Solving Using Conversions and Dimensional Analysis**

Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: Date:

Using the units to help you solve problems in science is a benefit to the presence of units associated with numbers in science.  Often a measurement can be in a unit that is of a different dimension than another measurement.  In this case the measurement has to be converted.  By learning what various prefixes mean, such as “kilo” and “milli” or “mega,” you can use the relationship of this prefix with the standard unit to establish a conversion factor.  For example, there are 1000 m in one 1 km.  Therefore, I can state a relationship between these as 1000 m = 1 km.  The numbers of these two are not equal but the measurement is.  I can build a conversion factor between a meter and kilometer by writing this equation as a ratio of 1000 m/ 1 km or 1 km/ 1000 m.  I can use this ratio is either form to convert between km and m.  In this worksheet you will practice converting units using single and then multiple conversion factors.  Then you will be given relationships between two otherwise unrelated units and be able to use that ratio as a conversion factor in a dimensional analysis method of solving certain problems.

**PART I: What conversion factor would you use to convert the following**

1. years to days
2. liters to mL
3. kilograms to grams
4. minutes to hours
5. nm to m

**PART II:      Convert the following using Dimensional Analysis. Show all work and use scientific notation as necessary.**

1. 484 days to years
2. 125 mL to liters
3. 5 x 103 kg to grams
4. 0.12 hrs to min
5. 1.35 nm to meters
6. 25,400 mm to megameter
7. 18.7 x 103 g to decigrams
8. $162.00 to nickels

**Part II**: Solving Problems with Dimensional Analysis

Units that represent a ratio like “mph” miles per(/) hour can be used as a conversion factor.  Sometimes these values are given to you sometimes they involve constants and other times they are what you derive.  In solving problems that involve several steps and conversion factors remember the canceling principle, take one conversion at a time and use the number with a single dimension to start with.

1. How many seconds are there in one week?
2. If a car goes 30.0 miles per gallon of gasoline, how many kilometers could it travel on a full tank of gasoline (assume a 17 gallon gas tank)?  (1.61 km = 1 mile)
3. Gravity is measured as 9.8 meters/second. What is gravity in terms of kilometer per hour?
4. The density of a substance is measured as 12.2 grams per cubic centimeter. What is this density in kilograms per liter? (1 cm3 = 1mL)