Name: Summer Assignment: Prerequisite Math Skills!

Directions: All of the mathematical problems in this assignment involve prerequisite skills that you will need to know how to do this year in AP Chemistry in order to perform at the mastery level. Solve the following problems **showing all work being asked for**. This assignment will be collected on the second day of AP Chem classes.

1. Convert the following numbers out of scientific notation into standard form:

a. 1.38 × 104 = b. 1.38 × 10-2 =

c. 0.40 × 107 = d. 0.40 × 10-9 =

e. 0.40 × 101 =

2. Convert the following numbers from standard form into scientific notation:

a. 270 = b. 0.003898 =

c. 0.00000000100 = d. 5,413,985,000 =

3. Identify which number is greater in the following pairs *and* explain how you can tell.

a. 1.38 x 104 or 1.38 x 103 b. 1.38 x 104 or 9.236 x 103

c. 1.38 x 102 or 1.38 x 10-14 d. 1.38 x 10-4 or 8.5 x 10-7

4. Convert the following units given the following ratios. Show all of your work either by moving the decimal, multiplying, or dividing.

1. L = 1000 mL 1 kg = 1000 g 1 cm = 10 mm 1 nm = 10-9 m 1 mi = 1.6 km

a. 9,876 mL = \_\_\_\_\_\_\_\_\_\_ L b.565 g = \_\_\_\_\_\_\_\_\_\_ kg

c. 0.023 kg = \_\_\_\_\_\_\_\_\_\_ g d. 434 nm = \_\_\_\_\_\_\_\_\_\_ m

f. 7219 mm = \_\_\_\_\_\_\_\_\_\_ cm g. 536 km = \_\_\_\_\_\_\_\_\_\_ mi

5. Solve for “x” in the following expressions. **Show your calculations**. For scientific notation, you can convert to standard form first to make plugging into your calculator easier OR be sure to use parenthesis when plugging into you scientific calculators.

a. 6x = 54 b. $\frac{x}{12.6}= \frac{0.55}{29.34}$

c. $15.6= \frac{106.8}{x}$ d. 7.1 × 10-6 = $\frac{x^{2}}{0.010}$

6. The following equation represents Coulomb’s Law, which describes the relationship between energy (E) and charge (q) & size (r) of two ions in an ionic bond (“k” is a constant that is not important for these questions).

$$E= \frac{kq\_{1}q\_{2}}{r}$$

a. If the charge of an atom “q” increases, describe mathematically what will happen to the energy “E” in an ionic bond. (Hint: is the numerator increasing or decreasing? Will this increase or decrease the magnitude of the fraction?)

b. If the size of an atom “r” increases, describe mathematically what will happen to the energy “E” in an ionic bond. (Hint: is the denominator increasing or decreasing? Will this increase or decrease the magnitude of the fraction?)