**Prerequisite knowledge and skills – AP Environmental Science**

You are expected to enter the course with a good understanding of basic scientific and mathematical concepts and skills as well as strong, reading, writing and speaking abilities. Although we will continue to develop these skills throughout the year, your success in the class is also dependent upon what you bring to it at the onset. Over the summer, review the scientific concepts and mathematical calculations below. We will be building upon and referencing them throughout the year. **You should be prepared to take a quiz on these skills and concepts during the first few weeks of school.**

**Prerequisite Basic Scientific Concepts:**

1. You should be familiar with the following terms/concepts from Biology, Chemistry, and Earth Science. Write a definition for each of the terms below.

Organic vs. Inorganic

Natural vs. Synthetic

Radioactive decay

Half life

Law of Conservation of Matter

1st Law of Thermodynamics

2nd Law of Thermodynamics

Organism

Species

Population

Community

Ecosystem

Producers/Autotrophs

Consumers/Heterotrophs

Decomposers

Photosynthesis (reactants and products)

Cellular Respiration (reactants and products)

Adaptation

Natural Selection

Biodiversity

Extinction

Plate Tectonics

Weathering

Climate Change

Rocks vs. Minerals

Climate vs. Weather

2. Write the full name of each of these chemical abbreviations:

CO2 S

CO SO2

C6H12O6 Cl

CH4 K

H2 NaCl

H2O Pb

N2 Hg

NOX Rn

NO3- U

NH3

O2

O3

P

P043-

**Prerequisite Basic Mathematical Skills**

**Percentage**

17% = 17/100 = .17

* Remember that "percent" literally means divided by 100.
* Percentage is a measure of the part of the whole. Or part divided by whole.

-15 million is what percentage of the US population? 15 million / 300 million = .05 = 5%

- What is 20% of this $15 bill so that I can give a good tip? $15 x .20 = $15 x 20/100 = $3

**Rates**

Rise Y2-Y1 slope change y=mx+b dX

Run X2-X1 time dt

* All of the above are ways to look at rates. The second equation is the easiest way to calculate a rate,  
  especially from looking at a graph. Rates will often be written using the word "per" followed by a  
  unit of time, such as cases per year, grams per minute or mile per hour. The word per means to  
  divide, so miles per gallon is actually the number miles driven divided by one gallon.
* Rates are calculating how much an amount changes in a given amount of time.

**Scientific Notation**

Thousand = 103 =1,000

Million = 106 =1,000,000 (people in the US)

Billion = 109 =1,000,000,000 (people on Earth)

Trillion = 1012 =1,000,000,000,000 (National debt)

* When using very large numbers, scientific method is often easiest to manipulate. For example, the US  
  population is 300 million people or 300xl06or 3xl08
* When adding or subtracting, exponents must be the same. Add the numbers in front of the ten and  
  keep the exponent the same.
* When multiplying or dividing, multiply or divide the number in front of the ten and add the exponents if  
  multiplying or subtract the exponents if dividing

Ex. 9xl06/ 3xl02 = (9/3) x 10(6-2) = 3 x 104

**Dimensional Analysis**

You should be able to convert any unit into any other unit accurately if given the conversion factor. Online tutorials are available:

http://www.chemprofessor.com/dimension\_text.htm http://www.chem.tamu.edu/class/fyp/mathrev/mr-da.html

**Prefixes**

m (milli) =1/1000  =10-3

c (cent) =1/100 = 10'-2

k (kilo) =1000 =103

M (mega) =1,000,000 =106

G (giga) =1,000,000,000 =109

T (tera) =1,000,000,000,000 =1012

**3. Sample Math Problems:** Complete the following problems.

1) What is one million times one thousand? Show your work in scientific notation. Give the answer in scientific notation and in words.

2) A population of deer had 200 individuals. If the population grows by 15% in one year, how many deer will there be the next year?

3) One year I had 40 AP Environmental Science students and the next year I had 50 Environmental Science students, what percentage did the population of APES students grow by?

4) Electricity costs 6 cents per kilowatt hour. In one month one home uses one megawatt hour of electricity. How much will the electric bill be? (Be sure to look at the prefixes chart on the previous page for the conversion of mega to kilo.)

5) Your car gets 15 miles to the gallon and your friend's car gets 25 miles to the gallon. You decide to go on a road trip to Virginia Tech, which is 300 miles away. If gas costs $4 per gallon and you decide to split the gas money, how much money will you save in gas by driving your friend's car?

6) Virginia Beach is 10 miles wide and 30 miles long. If one inch of rain falls on Virginia Beach, how many cubic feet of rain fell on Virginia Beach. (Hint: convert all units to feet first. 1 mile = 5280 feet).