Unit Overview
Introductory Concepts

Unit Purpose:
Chemistry is a great amalgamation of history, English, math and science. We need to use all of these skills!
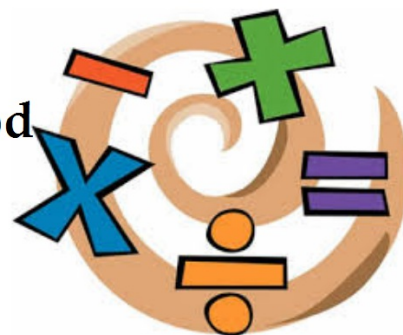
Unit Outline:
I. Scientific Notation
II. Basic Algebra Skills (for Chemistry)
III. English vs. Metric Units
IV. Conversions with Factor-Label Method
V. Using Reference Materials

Lesson Overview
Scientific Notation & Basic Algebra

Objective: The student will be able to (1) write values in standard and scientific notations, (2) solve basic algebra expressions.

Scientific Notation:
Expressing Large and Small Quantities

In Science, we use very large and small numbers like:
    1. the speed of light = 300000000 m/s
    2. the K_w in acid-base Chemistry = 0.00000000000001

- The problem with expressing numbers this way.

We use scientific notation as a solution to this problem!

Scientific Notation:
Expressing Large and Small Quantities

$$2 \times 10^9$$

2.000000000

1 2 3 4 5 6 7 8 9

2,000,000,000

Large numbers get a positive exponent. Small numbers get a negative exponent.

Sample Problem
Scientific Notation

Express these values in scientific notation:

(a) 45600000   **(b)** 0.00000025678

Additional Practice

For additional practice, let's convert the first two values we encountered into scientific notation. Write these numbers in the margin next to these numbers.

1. the speed of light = 300000000 m/s
2. the K_w in acid-base Chemistry = 0.00000000000001

Basic Algebra Skills

We need algebra to solve expressions and eventually evaluate them for some number.

We *never memorize* equations. You will always be given the equation you need. It is your job to determine which one you will need.

Sample Problem

Solve the following algebraic expression for the indicated variable:

a) $4x + 3 = 10$ for "x"

Sample Problem

Solve the following algebraic expression for the indicated variable:

b) $10x - 7 = 13x + 11 + 15$ for "x"

Sample Problem

Solve the following algebraic expression for the indicated variable:

c) $5(x + 4) = 21 + -3(x - 2)$ for "x"

Sample Problem

Solve the following algebraic expression for the indicated variable:

d) $2(p + 6) + 3(m - 14) = 22p - 3(m + 12) - 15$ for "m"

Evaluating Algebraic Expressions

 Of course, we practice solving algebraic expressions so that we can eventually *evaluate* these expressions with an actual number. We will follow these steps every time we solve an algebraic expression in this class:

1. Identify the equation and variable to solve.

2. Write the expression in terms of the indicated variable.

3. Plug in values for known quantities.

In the past, you've been taught to switch steps 2 and 3. This is a problem in Chemistry. It leads to more error in calculations.

Sample Problem

Solve each equation for the variable "k" and then evaluate each expression using the values given:

$$k = x - 7 + y(x - (y - 7)) \text{ where } (y = 7, x = 7)$$

Sample Problem

Solve each equation for the variable "k" and then evaluate each expression using the values given:

$$(x - c) \div (k \cdot (3 - c)) = 2 \text{ where } (x = 9, c = 5)$$