Unit 1: Scientific Process
Content Outline: Metric System (1.3)- Part 1

I. System of measurement (SI System) used to measure Length, Volume, Mass, Temperature, and Time
   A. Based on the number 10

Kilo- = thousand   (1000.)
Hecto- = hundred   (100.)
Deca- = ten   (10.)
Base Unit - Meter, Gram, Liter (1.)
Deci- = one-tenth   (.1)
Centi- = one-hundredth   (.01)
Milli- = one-thousandth   (.001)

   B. **Length**- the *distance* from one point to another
      1. The base unit of length is the **meter (m)**.
      2. Three units that measure the length of smaller objects are the decimeter, centimeter, and millimeter.
      3. Every ten centimeters is one decimeter.
      4. The longer lines on the metric ruler are centimeters.
      5. The shorter lines on the metric ruler are millimeters.
      6. One meter is divided into ten decimeters; the decimeter is divided into ten centimeters, and the centimeter is divided into ten millimeters.

   C. **Volume**- The amount of *space* an object takes up
      1. The base unit of length is the **liter (L)**.
      2. To measure the volume of smaller liquids, the milliliter is used.
      3. The instrument used to measure the volume of liquids is the graduated cylinder.
      4. The graduated cylinder has markings that are in increments of milliliters.
      5. Meniscus- the curve in the top surface of water in the graduated cylinder. "the bubble"
      6. Formula for measuring volume of regular (rectangular/prism) objects= Length x width x height
      7. 1 L= 1000mL
      8. 1 L= 1000cm^3
      9. 1mL=1cm^3

   D. **Mass**- the measure of the *amount of matter* an object contains
      1. **Matter**- the material that all objects and substances are made up of; anything that has mass and takes up space
      2. The base unit of mass is the **gram (g)**.
      3. Smaller objects such as a paperclip would be measured in milligrams.
      4. Mass is measured using an electronic balance.

   E. **Temperature**- the measure of the *intensity of all the heat in the substance* as the molecules move
      1. Measured in **degrees Celsius (^{0}C)**
         A. **Fahrenheit** (old English system) temperature conversions:
            1. Fahrenheit → Celsius: (^{0}F – 32) X 5/9 = ^{0}C
            2. Celsius → Fahrenheit: ^{0}C X 9/5 + 32 = ^{0}F
            3. Notice that the equations are inverse (opposite) of each other.
         B. **Kelvin** (Physics related measurement) conversion:
            1. Celsius → Kelvin: ^{0}C + 273 = ^{0}K
            2. Kelvin → Celsius: ^{0}K – 273 = ^{0}C

   F. **Time**
      1. Measured in **seconds (sec.)** with the use of a timer or stopwatch