Name(s) _____

Workshop: Dimensional Analysis

In this workshop, we will use a group problem-solving method called a round robin. The round robin method helps people to work together and feel comfortable with group problem solving.

Round Robin Instructions

1. Each group member will be assigned a number, starting with #1 and ending with the number of people in the group.

2. Student #1 will read the question aloud and define the information needed to solve the problem, Sep #1 in the outline.

3. When the group agrees that the necessary information is complete, student number two will do the first mathematical step, Step #2 in the outline.. When the group agrees that the step is correct, student number three will do the next step. Continue this way until the group agrees that the given unit has been correctly converted to the wanted unit.

4. Student #2 will start the next question by reading it aloud as in #1. Follow this pattern for all of the questions in the workshop.

Questions

Use dimensional analysis and the group round robin to answer each question. Record your solutions and notes in the spaces provided on this worksheet. Turn-in the worksheet when completed.

1. Use the dimensional analysis (unit conversion, factor label) problem-solving method to answer the following questions.

    a. How many nickels would you get for a twenty dollar bill?

    b. How many hours are in a week?

    c. How many revolutions does the hour hand on a clock make in a year?

2. Find the number of centimeters in 1.00×10^2 yards.

3. Determine the number of meters in 1.00 mile.

4. The speed of light is 1.86×10^5 miles per second. How many meters will light travel in 1.0 second?

5. Calculate the number of seconds in a year.

6. A *light year* is the distance that light travels in one year. Determine the number of miles, meters, and kilometers in one light year.

7. A single layer of gold atoms forms a surface whose dimensions are 1.0×10^3 angstroms by 1.0×10^3 angstroms. 1 angstrom $\equiv 10^{-10}$ meter.

   a) What is the area of this surface in square angstroms?

   b) What is the surface area in square centimeters?

8. The units of the chain system of measure, used by surveyors, are as follows:

7.92 inches = 1 link	100 links = 1 chain
10 chains = 1 furlong	80 chains = 1 mile

   The distance of the Kentucky Derby, a classic horse race, is 1.25 miles. How is this distance expressed in furlongs?

9. A cube that has a length of 1 cm on each side has a volume of 1 cm^3. How many cubic centimeters are in 1 cubic meter? (*Hint:* The answer is *not* 100.)