Instructions for Working out the Worksheets:
Work in groups of 4 on these problems. You should try to answer the questions without referring to your textbook. If you get stuck, try asking another group member for help. Your TA will come around when needed to help guide you.

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, create an outline on how you can solve the problem.
3. When the group agrees that the necessary information is complete, student number two will do the first mathematical step. 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 answer had been correctly converted to the wanted answer.
4. Student #2 will start the next question by reading it aloud as in #1. Follow this pattern for all the questions in the session.

Topics being Covered in the Worksheet:

1. Significant Figures
2. Rounding
3. Scientific Notation
4. Dimensional Analysis
5. Unit Conversion
6. Density

In the following problems you will be solving mathematical problems to help you understand topics 1-3. Make sure you have the correct significant figures for each problem. For each of the following calculations, provide the answer with the correct number of significant figures and in scientific notation.

a) 4.53×10^5 + 2.2×10^6 =

b) 1913.0 – 4.6×10^3 =

c) 2.34×10^{24} + 1.92×10^{23} =

d) 2.130×10^3 – 6.6×10^2 =

e) 9.10×10^3 + 2.2×10^6 =

f) 1113.0 - 14.6×10^2 =

g) 6.18×10^{-45} + 4.72×10^{-44} =
2. In the following problems you will be converting each of the following values into the indicated metric units; to help you understand topic 5. Make sure you have the correct significant figures for each problem.

a) 68 kg = ________ g
b) 568 cm = ________ m
c) 8700 mL = ________ L
d) 25 mg = ________ g
e) 0.101 cm = ________ mm
f) 250 mL = ________ L
g) 600 g = ________ kg
h) 8900 mm = ________ m
i) 34.6 cm = ________ µm
j) 67.49 nL = ________ L
k) 15.8 mL = ________ cm³
l) 500.0 mL = ________ m³
m) 816 mm³ = ________ cm³
n) 265 cm³ = ________ L
o) 0.248 mg = ________ kg

3. In the following problems you will be apply the rules for **significant figures**, scientific notation, and **unit conversions** to determine the results to help you understand topics 1-6. Make sure you have the correct significant figures for each problem.

   a) A researcher prepares a mixture of reagents in a beaker by combining 124.53 mL of solution A, 23.900 × 10⁻⁴ L of solution B, and 565×10⁸ µL of solution C. What is the final volume of the mixture?

   b) You have a piece of metal and wish to determine its density. The shape is irregular, so it isn't possible to directly measure the volume of the metal, so you decided to use displacement to measure the volume. You fill a 50.00 mL graduated cylinder with 36.86 mL of water. Once you have immersed the metal in the water, the level of the water has risen to 43.60 mL. The combined mass of the graduated cylinder and the water was determined to be 77.339 g. With the addition of the metal, the combined mass was found to be 159.567 g. From this information, determine the density of the metal.
c) A sodium chloride (NaCl) solution is being prepared for an experiment. The preparation requires the scientist to dissolve two scoops of solid NaCl in a volume of pure water. The first scoop that the scientist takes weighs 1.468 g, and the second scoop weighs $8.74 \times 10^{-4}$ kg. Both scoops are put into a 250 mL beaker, and dissolved with 186.5 cm$^3$ of water. What is the molar (mol/L) concentration of NaCl in the final solution? Note: NaCl = 58.44 g/mol

d) Mercury metal is poured into a graduated cylinder that holds exactly 22.5 cL. The mercury used to fill the cylinder weighs 306.0 mg. From this information, calculate the density of mercury.

e) What is the weight of the ethyl alcohol, in cg, that exactly fills a 200.0 L container? The density of ethyl alcohol is 0.789 g/mL.

f) A rectangular block of copper metal weighs 1896 g. The dimensions of the block are 8.4 pm by $6.9 \times 10^5$ cm by 9.6 Mm. From this data, what is the density of copper? (Volume = $a^3$)

g) A flask that weighs 345.8 mg is filled with 225 mL of carbon tetrachloride. The weight of the flask and carbon tetrachloride is found to be 703.55 dg. From this information, calculate the density of carbon tetrachloride.