**Measurements and Sig Figs lab handout (Air problem)**

Name and date submitted (3 pts):

 (13 questions, 5 pts each, 65 points total)

Problem 1: Calculate the weight of air in the laboratory

1. Guess what the air in this laboratory weighs, in approximate pounds \_\_\_\_\_\_\_\_\_\_\_\_\_
2. Calculate the volume of the laboratory (the garage-lab in this case) in cubic meters (m3). Report your answer using the correct number of significant figures. (sig figs for multiplication are limited to the least # of sig figs in the numbers being multiplied)

Sketch it:

Calculate it:

1. Use the density equation D = m/V to calculate the mass of the air in the room in kilograms. The density of air is 1.22 kg/m3. Report your answer with the correct significant figures.
2. How much does the air weigh in pounds? Convert the kilograms in the last question to pounds. Use the conversion factor of 2.20 lbs/kg. Use the correct significant figures.
3. How close was your original guess? Calculate the percent error, with the correct sig figs.

% error = $\frac{\left|measured-calculated\right|}{measured}$ , then convert to a percentage

Problem 2: Steel spheres

In problem 1 you calculated the volume of the laboratory in m3. Now you will calculate how many steel spheres you can pack in this space.

1. Guess how many spheres will fit in the classroom. There is no wrong answer. \_\_\_\_\_\_\_\_\_\_\_\_
2. Using the Vernier caliper provided, measure the diameter of the steel sphere in cm. Report your answer to the nearest 1/100th of a cm. (for example 2.25 cm)
3. Using the formula Vsphere = 4/3 πr3, compute the volume of the sphere in m3. Use the correct sig figs and scientific notation.
4. Use the formula (#spheres = Vroom/Vsphere) to compute the number of spheres that can be packed into the classroom, using a “void space” of 35.0%. Use scientific notation, and the correct sig figs.

Be sure to use a “void space” of 35.0% in your calculation. In other words, assume 35.0% of the volume of tightly-packed balls is air.

1. How close was your original guess? Calculate the percent error, with the correct sig figs.

% error = $\frac{\left|measured-calculated\right|}{measured}$ , then convert to a percentage

Problem 3: Mass and density

1. Mass of each sphere: Look up the density of steel in kg/m3. Using the volume of each sphere in m3 which you calculated above, compute the mass in kg of each steel sphere. Use the density formula D = m/v. Use the correct Sig Figs.
2. Using a gram-scale, measure the mass of a single sphere in kg. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
3. How close was your calculated mass to the actual mass? Calculate your % error: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

% error = $\frac{\left|measured-calculated\right|}{measured}$ , then convert to a percentage