Measurement & Graphing Lab

PURPOSE: This experiment will give you a chance to use some common lab equipment, gather and display data, as well as make predictions based on your data.

MATERIALS: 1 250 mL beaker   balance
                        water   sand

PROCEDURE:
Note: DO NOT measure the mass of your empty beaker at any time during this experiment.
1. Start by "zeroing" your balance as shown in class.
2. Fill the beaker with 25.0 mL of sand. Make sure you measure the 25 mL as accurately as possible.
3. Measure the mass of the beaker and sand. Record the mass in the data table below using the correct number of significant figures.
4. Now fill the beaker with 50.0 mL of sand. Measure and record its mass.
5. Repeat step #4 for 75.0 mL and 100.0 mL of sand.
6. Empty and clean your 250 mL beaker.

Now repeat the above procedure using water instead of sand.

DATA TABLE:

Volume of material	Mass of beaker + sand (grams)	Mass of beaker + water (grams)
25.0 mL		
50.0 mL		
75.0 mL		
100.0 mL		

GRAPH: Follow the *graphing guidelines* to plot both lines on a single graph.
1. Plot the 4 "sand" points first and then draw and label the "sand" line.
2. Then plot the 4 "water" points and draw and label the "water" line.
   You should end up with 2 straight lines, one for water and one for sand.

QUESTIONS: *Answer in ink using complete sentences.*
1. Density can be measured in grams per millilitre (g/mL).
   a. Using your graph (NOT your table) determine the density of sand.
      Show calculations here and indicate on graph where the values came from.

   b. Using your graph (NOT your table) determine the density of water.
      Show calculations here and indicate on graph where the values came from.

2. Explain in words how you found the density of sand <u>from your graph</u>. *One sentence is enough.*

3. Which of your 2 lines is the steepest? Explain why. (*DO NOT say because one is **heavier** than the other.*)

_____   _ _ _ _ __ __ _____

4. If you measured a beaker filled with iron rather than sand or water, would its line be steeper or flatter than the water and sand lines on your graph? Explain why. (*DO NOT use the terms **heavier** or **lighter** in your answer.*)

5. If you measured a beaker filled with alcohol rather than sand or water, would its line be steeper or flatter than the water and sand lines on your graph? Explain why. (*DO NOT use the terms **heavier** or **lighter** in your answer.*)
   <u>Note</u>: Alcohol is less dense than water. ethanol (0.79 g/mL) vs. water (1.00 g/mL)

6. The 2 lines your drew should cross the y-axis at the same point.
   a. Explain why.

   b. What does this point represent? _____

7. From **your** graph predict the following:
   a. the mass of your beaker with 20 mL of **water**   _____
   b. the mass of your beaker with 70 mL of **water**   _____
   c. the mass of your beaker with 20 mL of **sand**   _____
   d. the mass of your beaker with 70 mL of **sand**   _____
   e. the volume of **water** in your beaker if its mass is 200 grams   _____
   f. the volume of **sand** in your beaker if its mass is 200 grams   _____
   g. the mass of your beaker if it were empty   _____

CONCLUSION: