**DATA SHEET**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_ (50 points total)

1. (3 points) Use MS Paint or some other drawing program to draw a free body diagram of the hanging mass before it is submerged in the water. Paste your drawing in the space below.

2. (3 points) Use MS Paint or some other drawing program to draw a free body diagram of the hanging mass after it is submerged in the water. Paste your drawing in the space below.

3. (3 points) What is the force sensor measuring?

4. (3 points) Do your free body diagrams explain why the buoyant force is the difference between the force readings before and after submersion? Explain.

**Data**

(4 points) Enter the data from the experiment in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *F*g (N)weight | *F*a (N)apparent weight | *F*B (N)buoyant force | *V*1 (ml)final volume | *V*0 (ml)initial volume | *V*D (ml)displaced volume |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

(3 points) Paste the graphs of your data below.

(3 points) The slope from the straight line fit of the data is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

(3 points) The calculated value of the density of water is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The standard value for the density of water is 1000 kg/m3.

(3 points) The percent difference between your calculated value of the density of water and the standard value is\_\_\_\_\_\_\_\_\_\_.

(4 points) Enter the data form the experiment into the table below and calculate the specific gravity of the weights for each data point. The specific gravity is the weight divided by the buoyant force. Find the average of the specific gravity.

|  |  |  |
| --- | --- | --- |
| *F*g (N) | *F*B (N) | Specific Gravity  |
|  |  |  |
|  |  |  |
|  |  |  |

(3 points) The average specific gravity is \_\_\_\_\_\_\_\_\_\_\_.

Make an educated guess about the composition of the weights. Find the specific gravity of the material and compare the average found above with the value that you have found. Calculate a percent difference.

(3 points) The material I am comparing my data to is \_\_\_\_\_\_\_\_\_\_\_ with a specific gravity of \_\_\_\_\_\_\_\_\_\_.

(3 points) The percent difference between my data and the comparison material is \_\_\_\_\_\_\_\_\_\_\_\_.

**Questions**

1. (3 points) Why does the water exert a buoyant force on the metal?
2. (3 points) Does the data support Archimedes’ principle?
3. (3 points) What are some of the sources of error in the experiment?