

name \_\_\_\_\_

ID# \_\_\_\_\_

Experiment 11

**Buoyant Forces, Density, and Specific Gravity**

**Masses**

wood block \_\_\_\_\_

cylinder 1 \_\_\_\_\_ might be \_\_\_\_\_

cylinder 2 \_\_\_\_\_ might be \_\_\_\_\_

cylinder 3 \_\_\_\_\_ might be \_\_\_\_\_

cylinder 4 \_\_\_\_\_ might be \_\_\_\_\_

**Cylinder Volume and Density**

cylinder \_\_\_\_\_

diameter \_\_\_\_\_ height \_\_\_\_\_

$V_1 =$  \_\_\_\_\_

Water level 1 \_\_\_\_\_ Water level 2 \_\_\_\_\_

$V_2 =$  \_\_\_\_\_ % error = \_\_\_\_\_

$\rho_{\text{cylinder}} =$  \_\_\_\_\_ Substance = \_\_\_\_\_

Correct density = \_\_\_\_\_ % error = \_\_\_\_\_

Show equations and calculations here:

**Apparent masses**

cylinder 1 \_\_\_\_\_ cylinder 2 \_\_\_\_\_

cylinder 3 \_\_\_\_\_ cylinder 4 \_\_\_\_\_

**Difference between the actual and apparent mass:**

cylinder 1 \_\_\_\_\_ cylinder 2 \_\_\_\_\_

cylinder 3 \_\_\_\_\_ cylinder 4 \_\_\_\_\_

**The Wood Block**

block: L \_\_\_\_\_ H \_\_\_\_\_ W \_\_\_\_\_

volume of the block = \_\_\_\_\_  $\rho_{\text{wood}}$  = \_\_\_\_\_

**Estimated percentage of the block above water** \_\_\_\_\_

**Actual amount of the block above water** \_\_\_\_\_

**The Plastic Jar**

**Volume of the jar** \_\_\_\_\_

**Estimated amount of mass the jar will support** \_\_\_\_\_

**Actual amount of mass the jar supported** \_\_\_\_\_

**Mass of the jar and water together** \_\_\_\_\_

Mass of water in the jar \_\_\_\_\_

Show equations and calculations here:

**Specific Gravity**

$M_1$  \_\_\_\_\_

$M_2$  \_\_\_\_\_

$S =$  \_\_\_\_\_

**liquid** = \_\_\_\_\_

known  $S =$  \_\_\_\_\_

**% error** = \_\_\_\_\_

Show equations and calculations here:

**(8 points)**

*Densities of Some Common Substances ( $\times 10^3 \text{ kg/m}^3$ )*

<i>Copper</i>	8.92
<i>Iron</i>	7.87
<i>Lead</i>	11.4
<i>Gold</i>	19.3
<i>Aluminum</i>	2.70
<i>Mercury</i>	13.6
<i>Methanol</i>	.791
<i>Glycerin</i>	1.26
<i>Gasoline</i>	.68
<i>Brass</i>	8.00-8.60

## Questions

1. For each cylinder you found the difference between the apparent mass in air and in water. Were the differences nearly the same? Explain clearly why you got the result that you did.  
**(4 points)**
  
2. What do you think you would get if you measured the apparent mass of each of the other three cylinders in the unknown liquid? (Hint: Remember what happened when you massed the cylinders in water. Think about the buoyant force on each of the cylinders.) Pick one and calculate the actual value you would expect.  
**(4 points)**
  
3. If you found the apparent mass of one of the cylinders in a liquid with exactly twice the density of water what would it be? Pick a cylinder and calculate the expected answer.  
**(3 points)**
  
4. Look at the densities of your cylinders and the wood block. If you wanted to predict whether any substance would float in any liquid, what do you think would have to be true? For example, if you dropped a piece of lead into a pool of mercury, would it float or sink? What would sink in mercury?  
**(3 points)**