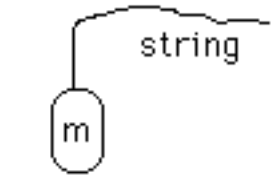
Density and Archimedes' Principle

Name _____
Lab Partner(s)_____
_____

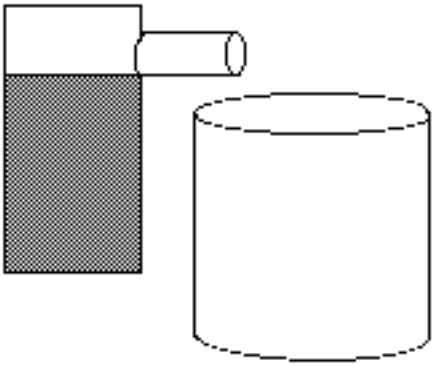
I. DENSITY

1. Each member of your lab group selects a different metal.
   (Circle yours) copper, lead, aluminum, tin, zinc
2. Your task is to determine the density of your metal object.
   First, determine the mass of your object. m_{object} =_____g =_____kg.
   Second, determine the volume of your object. V_{object}=_____m^3.
3. Use the overflow container to determine the volume of the displaced water which should equal the volume of the submerged object.

$$\rho_{object} = \frac{m_{object}}{V_{object}}$$



Density of _____ is _____kg/m^3



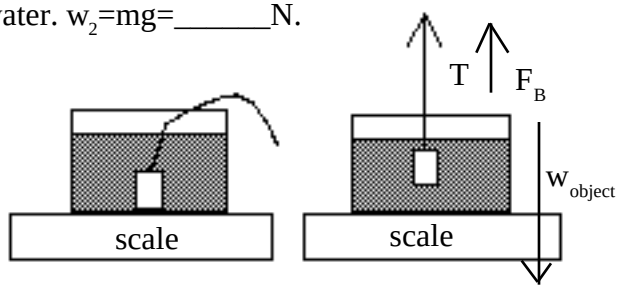
"*Weigh*" *your water*. $m_{\text{beaker+displaced water}} - m_{\text{beaker alone}} = m_{\text{displaced water}}$ = _____ g = _____ kg.

Now use the density of water to determine the volume of the displaced water. $\rho_{water} = \frac{m_{water}}{V_{water}} = 1000 kg/m^3$

$\text{Volume}_{\text{displaced water}}$ = _____ $m^3 = \text{Volume}_{\text{object}}$

II. ARCHIMEDES' PRINCIPLE

1. Determine the bouyancy force (F_B) on your object when it is completely submerged.
   First, record the scale reading of your object and the beaker and water it is sitting in. Tie a string of negligible mass to the hook on your object. w_1=mg=_____N.
   Second, record the scale reading when the object is lifted off the beaker but still submerged in the water. w_2=mg=_____N.



(Tension) T=w_1–w_2=_____N.
T+F_B=w_{object}=mg=_____N.

F_B=_____N.

2. Archimedes' Principle says this buoyancy force (F_B) equals the weight of the displaced fluid. $w_{displaced\ water}$=mg=_____N. (Don't forget to change grams to kilograms!)
3. Show your calculations of the percent error of this weight and F_B. (Use F_B as the denominator.)