PHYS 1007
Tutorial #5
Section A2 - WedPM

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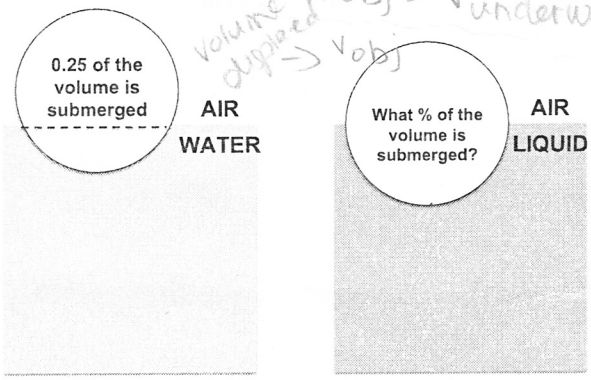
Problem 1

A solid sphere floats with 25% of its volume submerged in water. (a) Draw a free-body diagram of the sphere. (b) Find the density of the sphere. The density of water is 1000 kg/m^3. (c) The sphere is then placed in a bath full of a liquid with density 835 kg/m^3. What percentage of the volume of the sphere is submerged in the liquid?

$F_b = \rho V g$



volume displaced $\rightarrow V_{obj}$

$V_{obj} = V_{underwater}$

$\rho = \frac{m}{V}$

b)

Volume Submerged = 25%

$\rho_s = 1000 kg/m^3$

$\rho_w = 1000 kg/m^3$

V = 25% of 1000kg

= 250 L

$\rho_f V_{obj} = \rho_s V_s$

$V_{obj} = (0.25) V_s$

$\rho_f (0.25) = \rho_s V_s$

$1000(0.25) = \rho_s$

$250 kg/m^3 = \rho_s$

a)

b) $\rho_f = 835 kg/m^3$

$\rho_s = 250 kg/m^3$

$\rho_f V_{obj} = \rho_s V_s$

$(835 kg/(V_{obj}) \div 250)(V_s)$

$\frac{V_{obj}}{V_s} = \frac{250}{835}$

$0.30 = V_{ob}/V_s$

30% submerged