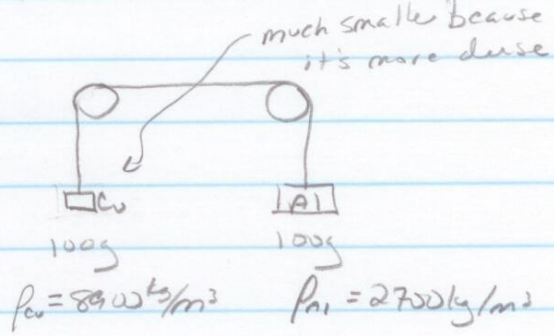
Ch 13 MC 31, P 28 & 49

MC. 31. In air this system balances because the two blocks have the same mass.



What happens if they are submerged in water?

A. Copper is a smaller block by volume so it will displace less water. This means it will have a lower buoyant force on it. So it will have less "lift" and will sink lower than the Aluminum block.

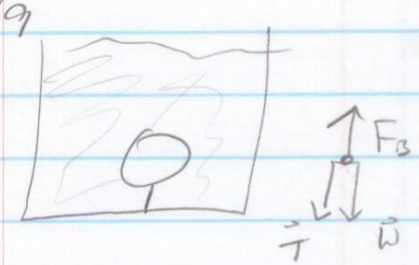
P.2. Containers A & B have equal volumes. Container A holds helium gas at 1.00 atm pressure at 20°C. Container B is completely filled with a liquid whose mass is 7600 times the mass of helium gas in container A. Identify the liquid in B.

The question is simply saying that the liquid in B has 7600 times the density of Helium.
Use Table 1 to see Helium's density $\rho = 0.166 kg/m^3$

$$\rho_? = 7600 \cdot \rho_{He}$$
$$= 7600 \cdot 0.166 kg/m^3$$
$$= 1262 kg/m^3$$

Glycerin is 1260 kg/m³ so that must be it!

49



$\Sigma F = F_B - T - w = 0$

A sphere is tethered to the bottom of a container filled with water. The tension in the string is $\frac{1}{3}$ the weight of the sphere. What is the density of the sphere?

Given $T = \frac{1}{3} w$

$F_B - T - w = 0$

$F_B = T + w$

$F_B = \frac{1}{3} w + w$

$F_B = \frac{4}{3} w$

$w = mg$ $\quad m = \rho V$

$= \rho V g$

$\rho_{H_2O} V g = \frac{4}{3} \rho_{sphere} V g$

$\rho_{H_2O} = \frac{4}{3} \rho_{sphere}$

$\frac{3}{4} 1000 kg/m^3 = \rho_{sphere}$

$\boxed{750 kg/m^3}$