# ENSC 388

Assignment #1 (Basic Concepts)

Assignment date: Wednesday Sept. 16, 2009

Due date: Wednesday Sept. 23, 2009
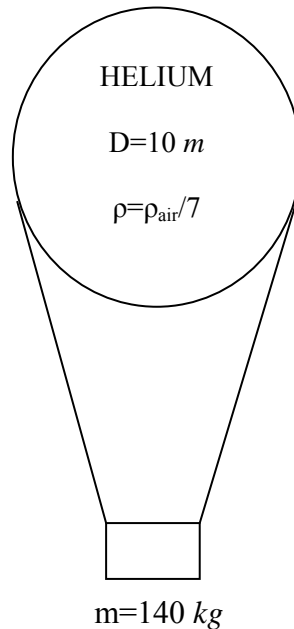
Problem 1: (Static Pressure)

Both a gage and a manometer are attached to a gas tank to measure its pressure. If the reading on the pressure gage is 80 *kPa*, determine the distance between the two fluid levels of the manometer if the fluid is (a) mercury (ρ =13,600 *kg/m³*) or (b) water (ρ =1000 *kg/m³*).
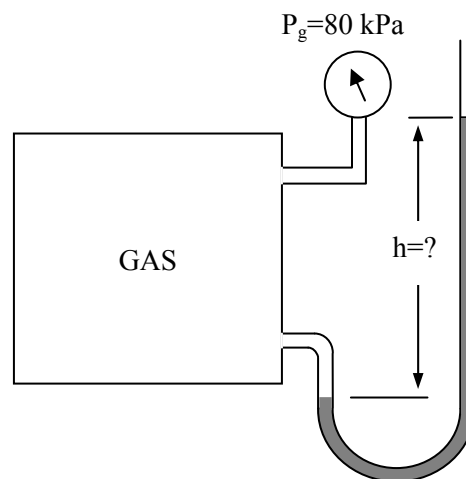
Problem 2: (Buoyancy)

Balloons are often filled with helium gas because it weighs only about one-seventh of what air weighs under identical conditions. The buoyancy force which can be expressed as $F_B = \rho_{air}gV_{balloon}$ will push the balloon upward. If the balloon has diameter of 10 *m* and carries two people, 70 *kg* each, determine (a) the acceleration of the balloon when it is first released and (b) the maximum amount of load, in *kg,*

the balloon can carry. Assume the density of air is $\rho = 1.16 \ kg/m^3$, and neglect the weight of the ropes and the cage. (Answers: 16.5 m/s^2, 520.6 kg)

HELIUM

D=10 m

$\rho = \rho_{air}/7$

m=140 kg

Problem 3: (Hydrostatic pressure)

The lower half of a 10-m-high cylindrical container is filled with water ($\rho = 1000 \ kg/m^3$) and the upper half with oil that has a specific gravity of 0.85. Determine the pressure difference between the top and bottom of the cylinder. (Answer: 90.7 kPa)

OIL

$\rho_s = 0.85$

h=10 m

WATER

$\rho = 1000 \ kg/m^3$