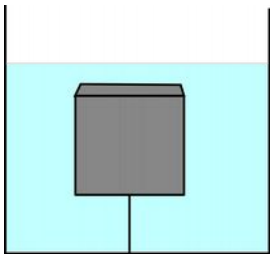
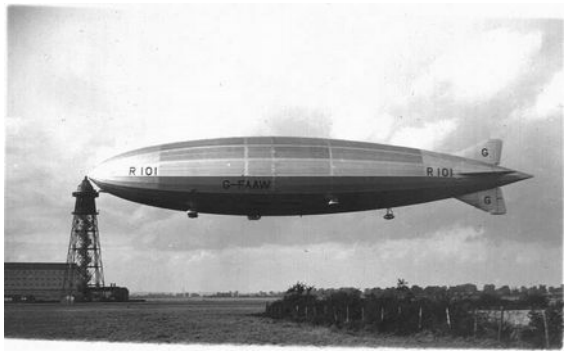
Buoyancy – Tutorial

density of air = 1.29kg/m^3 density of water = 1000kg/m^3 g = 9.81N/kg

1. A piece of cork of volume 2.0m^3 and density 250kg/m^3 is kept submerged below the surface of water in a tank by means of a lightweight cable, diameter 5.0mm. Calculate:
   (a) the tension in the cable, *(14.7kN)*
   (b) the stress in the cable, *(7.5x10^{8}Pa)*

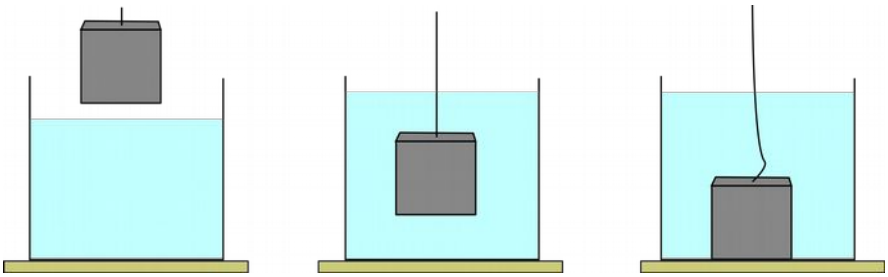


2. The airship R101 (which burst into flames when the hydrogen in it ignited) had a volume of 1.38x10^{5}m^3.



   Calculate:
   (a) the upthrust on the ship in air, *(1.75x10^{6}N)*
   (b) the weight of the gas in it if it is filled with
      (i) hydrogen, density 0.088kg/m^3, *(1.19x10^{5}N)*
      (ii) helium, density 0.176kg/m^3 *(2.38x10^{5}N)*
   (c) the differences between the upthrust and the weight of gas for these two gases. *(1.63x10^{6}N, 1.51x10^{6}N)*

3. A lump of concrete, volume 0.60m^3, density 2300kg/m^3, is lowered using a cable into a tank, mass 200kg, containing 5.0m^3 of water, resting on a platform.



Complete the table:

position of concrete	above water	suspended in water	on base of tank (cable slack)
tension in cable/kN			
force on platform/kN			

(13.5, 7.65, 0; 51.0, 56.85, 64.5)