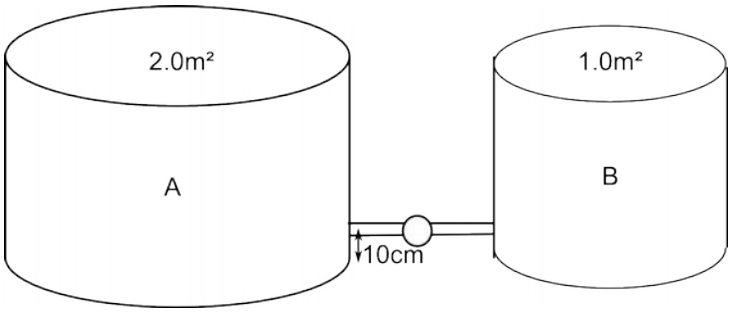
Pressure in Fluids – Tutorial

1. An aircraft has mass 350 tonnes, and the total area of its wings is 500m^2. Estimate the average difference in pressure there must be between the upper and lower surfaces of the wings. *(6.8kPa)*

2. Two tanks, A and B, are joined by a pipe with a valve, 10cm above the base of each tank. A has cross-sectional area 2.0m^2, B has cross-sectional area 1.0m^2.



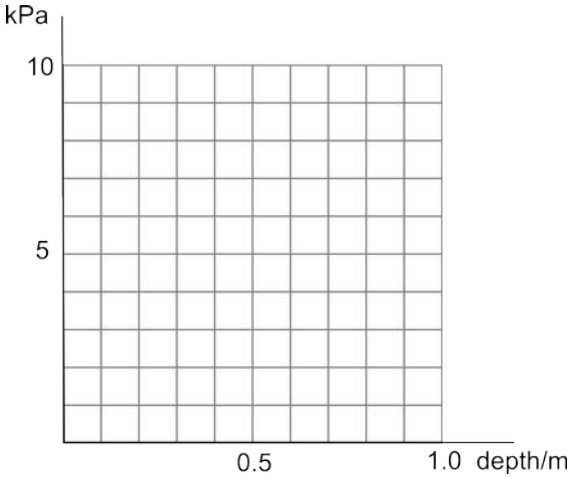
   The valve is closed and 1200kg water is put into A.

   (a) Calculate
   (i) the depth of water in A, *(0.6m)*
   (ii) the gauge pressure at the base of tank A, *(5.88kPa)*
   (iii) the pressure difference across the valve. *(4.9kPa)*

   (b) The valve is opened until water stops flowing. Calculate:
   (i) the depth of water in A, *(0.4m)*
   (ii) the gauge pressure at the base of tank A, *(3.92kPa)*
   (iii) the pressure difference across the valve. *(0Pa)*

3. A large tank for liquid waste contains a depth of 0.60m water, on top of which is a depth of 0.40m oil, relative density 0.80.

   Sketch a graph of excess pressure against depth from the surface of the liquid.



4. The density of sea water at the surface of the ocean is 1025kg/m^3. An increase in pressure of 2.1GPa increases the density of sea water by 1%. Assume that sea water compresses uniformly with depth.

   (a) Calculate the percentage increase in density at a depth of
   (i) 100m, *(0.0005%)*
   (ii) 1000m. *(0.005%)*

   (b) The depth of the deepest ocean is 11km. Is the water significantly denser there than it is at the surface? *(0.05%)*