Pressure in Fluids – Practice

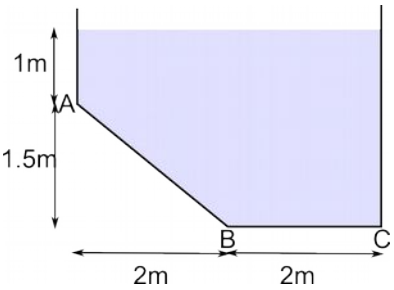
density of water = 1000kg/m^3

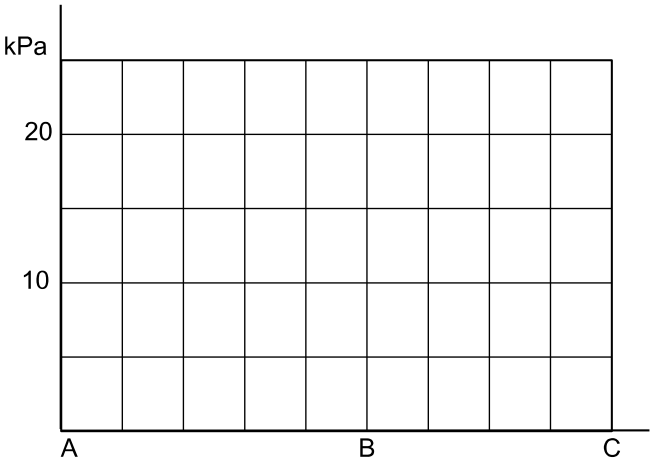
1. A tank is filled with oil, density 875kg/m^3, to a depth of 7.0m. On the bottom is a circular inspection hatch, diameter 0.75m.
   Calculate:
   (i) the pressure on the hatch,
   (ii) the force on the hatch. *(60kPa, 27kN)*

2. A research submarine has a 30cm diameter window. The manufacturer says the window can withstand forces up to 1.2×10^6N. The pressure inside the submarine is maintained at atmospheric pressure.
   Calculate the submarine's maximum safe depth in salt water, density 1025kg/m^3. *(1690m)*

3. A simple lifting jack has a pump piston 12mm diameter and a load piston 60mm diameter, The load being lifted is 8.0kN.
   Calculate:
   (i) the pressure in the oil,
   (ii) the force needed on the pumping piston. *(2.8MPa, 320N)*

4. Water fills a tank, which has the profile shown. Sketch a graph of the gauge pressure moving along the base of the tank ABC.





5. When a U-tube manometer, containing oil of relative density 0.80, is connected to a gas supply, the levels change as shown. The scale is in cm.

   Calculate the gauge pressure of the gas supply. *(314Pa)*