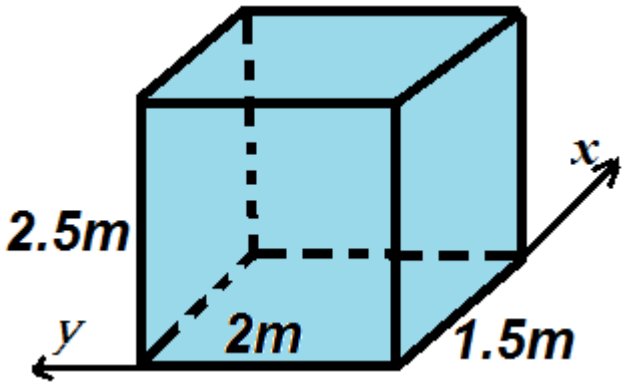
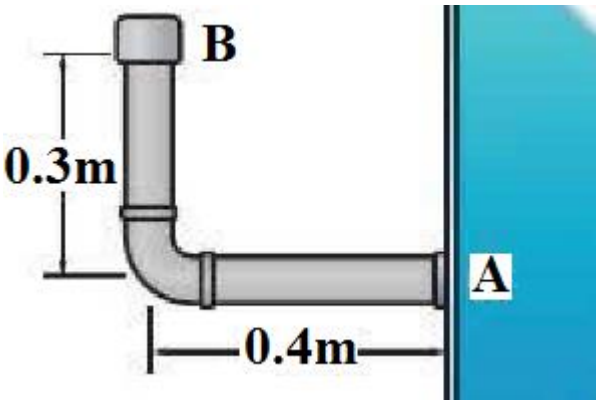
Q40/ The bin shown in figure, and is filled with water. Determine the resultant force and the *(x,y)* coordinate of the center of pressure on the bottom of the bin.



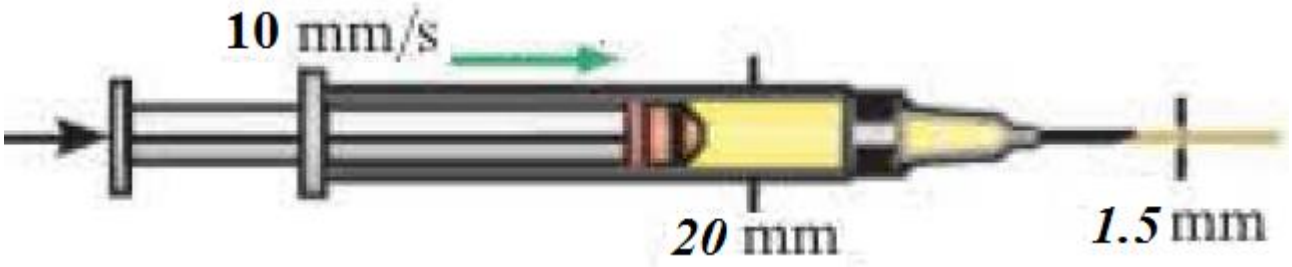
Q41/ Water fills the pipe AB such that the absolute pressure at *A* is 400 kPa. If the atmospheric pressure is 101 kPa, determine the resultant force the water and surrounding air exert on the cap at *B*. The inner diameter of the pipe is 50 mm.



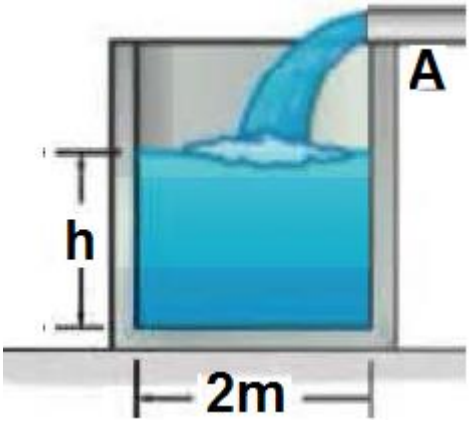
Fluid Sheet -2-

Q1/ The human heart has an average discharge of 0.1 (10^{-3}) m^3 / s, determined from the volume of blood pumped per beat and the rate of beating. Careful measurements have shown that blood cells pass through the capillaries at about 0.5 mm/ s. If the average diameter of a capillary is 6 μm, estimate the number of capillaries that must be in the human body. Ans. $7.07*10^9$

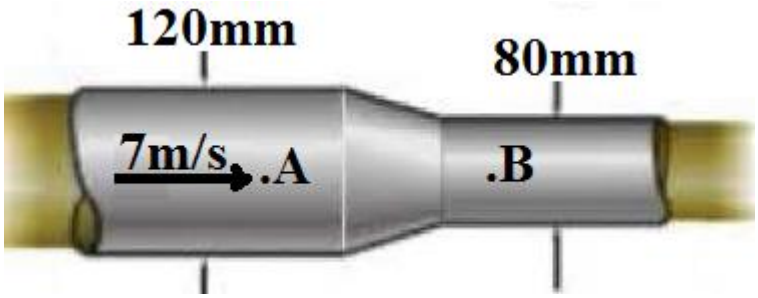
Q2/ The cylindrical syringe is actuated by applying a force on the plunger. If this causes the plunger to move forward at 10 mm/ *s*. determine the average velocity of the fluid passing out of the needle. Ans. 1.78 m/s.



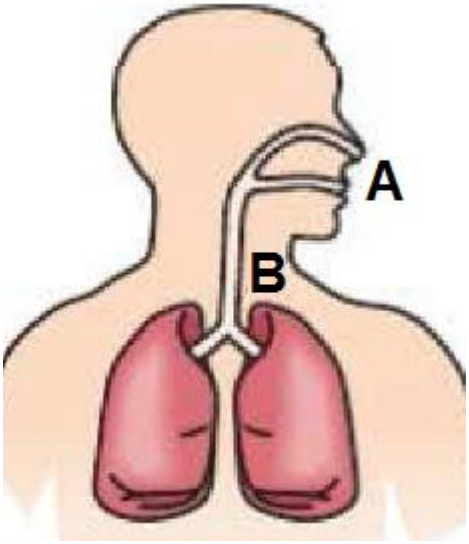
Q3/ Water flowing at a constant rate fills the tank to a height of h = 3 m in 5 minutes. If the tank has a width of 1.5m, determine the average velocity of the flow from the 0.2-m-diameter pipe at A. Ans.0.995m/s



Q4/oil is subjected to a pressure of 300 kPa at A, where its velocity is 7 m/s. Determine its velocity and the pressure at B (ρ_{oil} = 940 kg/ m^3)



Q5/ The average human lung رئتا الانسان takes in about 0.6 liter of air with each inhalation شهيق, through the mouth and nose, *A*. This lasts for about 1.5 seconds. Determine the power required to do this if it occurs through the trachea القصبة الهوائية *B* having a cross-sectional area of 125 mm^2. Take ρ_{air}= 1.23 kg/m^3. *(Hint:* Recall that power is force * velocity, where force = pressure*area). Ans. 2.52 mW



Q6/By applying a force F, a saline محلول ملحي solution is ejected from the 15mm diameter syringe through a 0.6-mm-diameter needle. If the pressure developed within the syringe is 60 kPa, determine the average velocity of the solution through the needle. Take ρ = 1050 kg/ m^3.