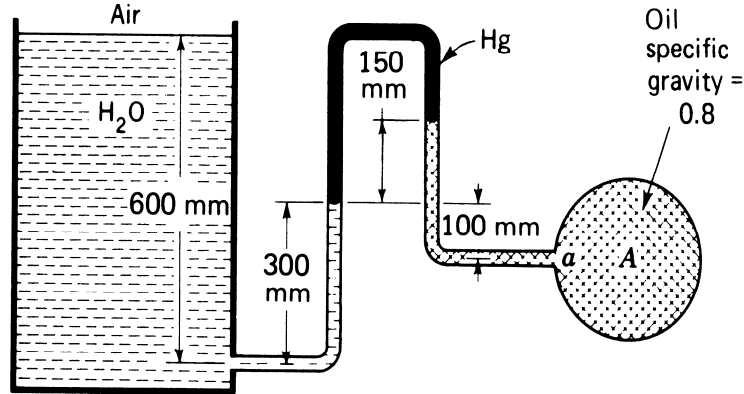1. A liquid has a viscosity of 0.005 kg/m•s and a density of 850 kg/m^3. Calculate the kinematic viscosity in (a) SI and (b) USC units and (c) the viscosity in USC units. (20%)

2. What is the absolute pressure in drum A at position *a*? (20%)

3. A block weighting 1 kN and having dimensions 200 mm on an edge is allowed to slide down an incline on a film of oil having a thickness of 0.005 mm. If we use a linear velocity profile in the oil, what is the terminal speed of the block? The viscosity of the oil is 7×10^{-2} poise. (sin 20°=0.34; cos 20°=0.94; tan 20°=0.36) (20%)
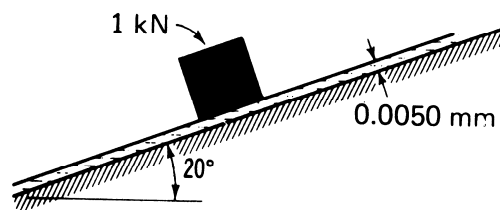
4. Water with a density of 1000 kg/m^3 flow through a vertical venturimeter as shown. A pressure gage is connected across two taps in the pipe (1) and the throat (2). The area ratio A $_{throat}$/A $_{pipe}$ is 0.5. The velocity in the pipe is 10 m/s. Find the pressure difference recorded by the pressure gage. Assume the flow has a uniform velocity distribution and that viscous effects are not important. (20%)
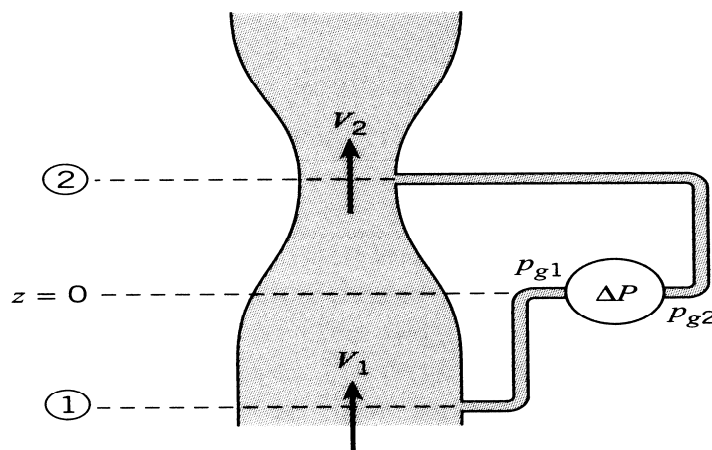
5. It is known that the pressure developed by a centrifugal pump, Δp, is a function of the diameter D of the impeller, the speed of rotation n, the discharge Q, and the fluid density ρ. D, n and ρ, three repeating variables are selected. Please by dimensional analysis, determine the π-groups relating these variables. (20%)