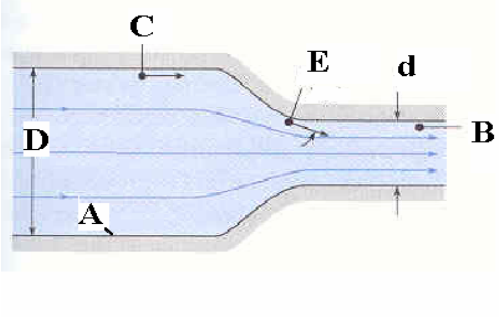
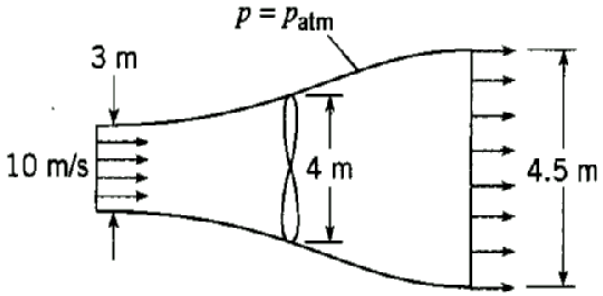
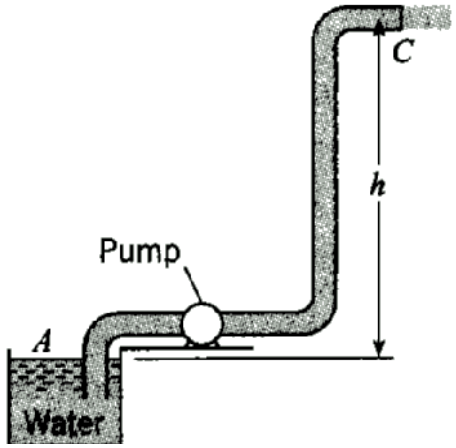
1. The flow pattern through the pipe contraction is as indicated, and the discharge of water is 70cfs. For d=2ft and D=6ft, what will be the pressure at point B if the pressure at point A is 3500psf ?



2. A windmill is operating in a 10 m/s wind that has a density of 1.2 kg/m^3. The diameter of the windmill is 4 m. The constant pressure (atmospheric) streamline has a diameter of 3 m upstream of the windmill and 4.5 m downstream. Assume that the velocity distributions are uniform and the air is incompressible. Determine the thrust on the windmill.



3. A pump draws water through an 8-in. suction pipe and discharge it through a 6-in. pipe in which the velocity is 12 ft/s. The 6-in. pipe discharges horizontally into air at point C. To what height h above the water surface at A can the water be raised if 30 hp is delivered to the pump? Assume that the pump operates at 70% efficiency and the head loss in the pipe between A and C is equal to $2.0V_c^2 / 2g$.



4. Consider steady viscous flow through a small horizontal tube. For this type of flow, the pressure gradient along the tube, $\Delta P / \Delta l$, should be a function of viscosity μ, the mean velocity V, and the diameter of the tube D. By dimensional analysis, derive a functional relationship relating these variables.