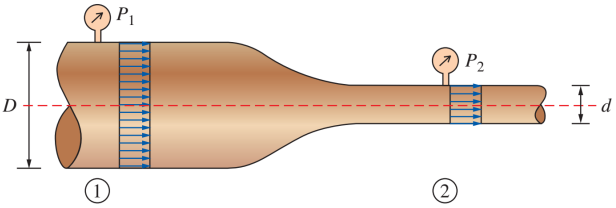
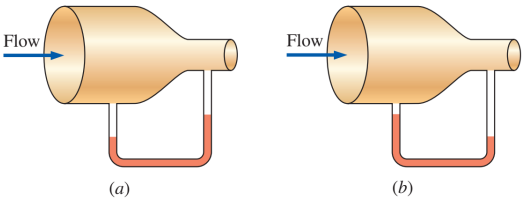
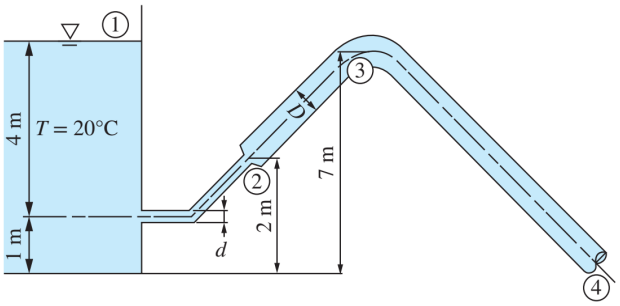
5–13 Air at 40°C flow steadily through the pipe shown in Fig. P5–13. If $P_1 = 40$ kPa (gage), $P_2 = 10$ kPa (gage), $D = 3d$, $P_{atm} \cong 100$ kPa, the average velocity at section 2 is $V_2 = 25$ m/s, and air temperature remains nearly constant, determine the average speed at section 1.



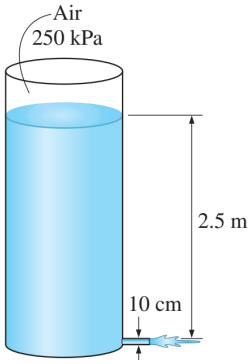
5–32C A glass manometer with oil as the working fluid is connected to an air duct as shown in Fig. P5–32C. Will the oil levels in the manometer be as in Fig. P5–32C*a* or *b*? Explain. What would your response be if the flow direction is reversed?



5–49 Water at 20°C is siphoned from a reservoir as shown in Fig. P5–49. For $d = 8$ cm and $D = 16$ cm, determine (*a*) the minimum flow rate that can be achieved without cavitation occurring in the piping system and (*b*) the maximum elevation of the highest point of the piping system to avoid cavitation. (*c*) Also, discuss the ways of increasing the maximum elevation of the highest point of the piping system to avoid cavitation.



5–51 A pressurized tank of water has a 10-cm-diameter orifice at the bottom, where water discharges to the atmosphere. The water level is 2.5 m above the outlet. The tank air pressure above the water level is 250 kPa (absolute) while the atmospheric pressure is 100 kPa. Neglecting frictional effects, determine the initial discharge rate of water from the tank. *Answer:* 0.147 m³/s



5–54 The water level in a tank is 20 m above the ground. A hose is connected to the bottom of the tank, and the nozzle at the end of the hose is pointed straight up. The tank cover is airtight, and the air pressure above the water surface is 2 atm gage. The system is at sea level. Determine the maximum height to which the water stream could rise. *Answer:* 40.7 m