

Zhejiang University
Department of Physics

General Physics (H)

Problem Set #7

1. What is the total mass of the Earth's atmosphere? (The radius of the Earth is 6.37×10^6 m, and atmospheric pressure at the Earth's surface is 1.013×10^5 N/m².)
2. A swimming pool has dimensions 30.0 m \times 10.0 m and a flat bottom. When the pool is filled to a depth of 2.00 m with fresh water, what is the force caused by the water on the bottom? On each end? On each side?
3. A Venturi tube may be used as a fluid flow meter (see Fig. 15.21). If the difference in pressure is $P_1 - P_2 = 21.0$ kPa, find the fluid flow rate in cubic meters per second, given that the radius of the outlet tube is 1.00 cm, the radius of the inlet tube is 2.00 cm, and the fluid is gasoline ($\rho = 700$ kg/m³).

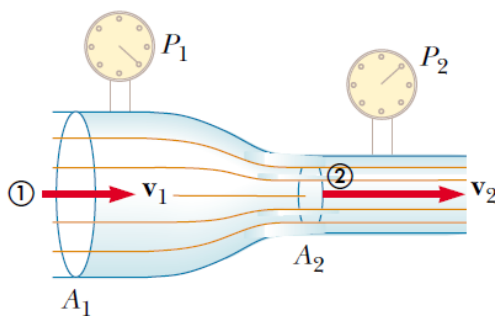


Figure 15.21

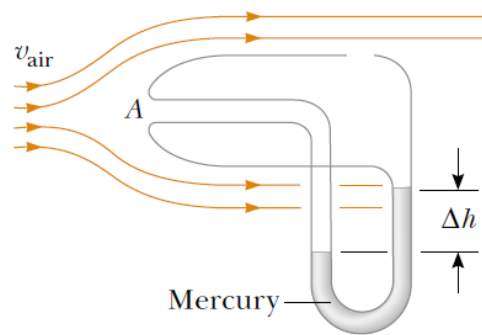


Figure P15.41

4. A Pitot tube can be used to determine the velocity of air flow by measuring the difference between the total pressure and the static pressure (Fig. P15.41). If the fluid in the tube is mercury, whose density is $\rho_{\text{Hg}} = 13\,600 \text{ kg/m}^3$, and if $\Delta h = 5.00 \text{ cm}$, find the speed of air flow. (Assume that the air is stagnant at point A, and take $\rho_{\text{air}} = 1.25 \text{ kg/m}^3$.)
5. A U-tube of uniform cross-sectional area and open to the atmosphere is partially filled with mercury. Water is then poured into both arms. If the equilibrium configuration of the tube is as shown in Figure P15.19, with $h_2 = 1.00 \text{ cm}$, determine the value of h_1 .

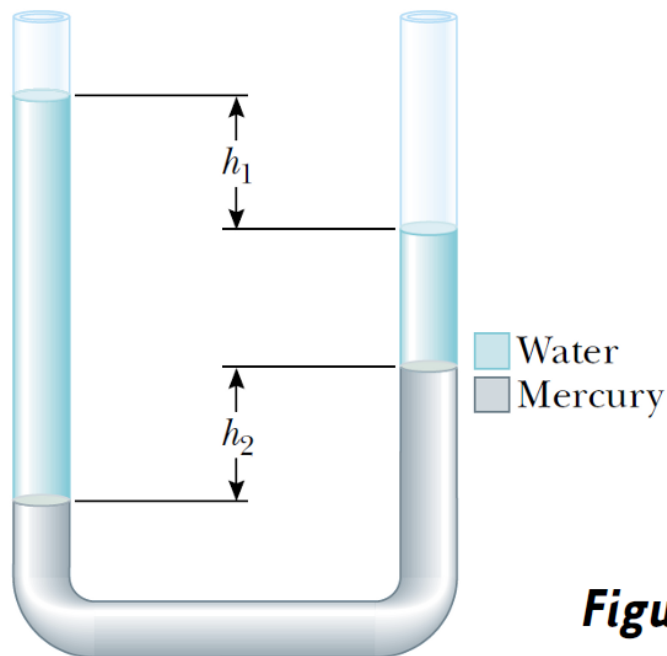


Figure P15.19