

Fluid Statics Problem Solutions

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3-12 The water in a tank is pressurized by air, and the pressure is measured by a multifluid manometer as shown in Fig. P3-12. Determine the gage pressure of air in the tank if $h_1 = 0.4$ m, $h_2 = 0.6$ m, and $h_3 = 0.8$ m. Take the densities of water, oil, and mercury to be 1000 kg/m^3 , 850 kg/m^3 , and $13,600 \text{ kg/m}^3$, respectively.

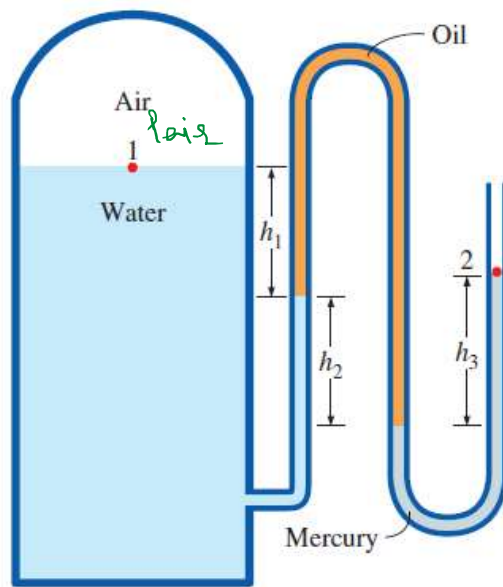



FIGURE P3-12

$$\begin{aligned} P_{\text{air}} + \rho_o g h_1 + \rho_w g h_2 - \rho_{\text{Hg}} g h_3 &= 0 \\ \Rightarrow P_{\text{air}} + (850 \times 9.81 \times 0.4) + (1000 \times 9.81 \times 0.6) - (13600 \times 9.81 \times 0.8) &= 0 \\ \Rightarrow P_{\text{air}} = 97511.4 \text{ Pa} = 97.5 \text{ kPa} \end{aligned}$$

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