2.14 (See Fluids in the News article titled “Giraffe’s blood pressure,” Section 2.3.1.) (a) Determine the change in hydrostatic pressure in a giraffe’s head as it lowers its head from eating leaves 6 m above the ground to getting a drink of water at ground level as shown in Fig. P2.14. Assume the specific gravity of blood is \( SG = 1 \). (b) Compare the pressure change calculated in part (a) to the normal 120 mm of mercury pressure in a human’s heart.

(a) For hydrostatic pressure change,

\[
\Delta p = \gamma h = (9.80 \text{ kN/m}^2)(6 \text{ m}) = 58.8 \text{ kN/m}^2 = 58.8 \text{ kPa}
\]

(b) To compare with pressure in human heart, convert pressure in part (a) to mm Hg:

\[
\Delta p = 58.8 \text{ kN/m}^2 = \gamma_{Hg} \cdot h_{Hg} = (133 \text{ kN/m}^2) h_{Hg}
\]

\[
h_{Hg} = (0.442 \text{ m})(10^3 \text{ mm/m}) = 442 \text{ mm Hg}
\]

Thus, the pressure change in the giraffe’s head is 442 mm Hg compared with 120 mm Hg in the human heart.