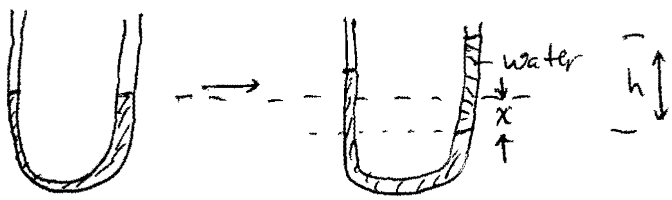
① 

Using mercury-water interface as reference,

height of mercury = $2x$

height of water = h

pressure of water = pressure of mercury

$$\rho_w g h = \rho_m g (2x)$$

$$x = \frac{\rho_w h}{2\rho_m} = \frac{(1.00\,g/cm^3)(11.2\,cm)}{2(13.6\,g/cm^3)} = 0.412\,cm$$

② (a) Weight of water is $W = mg = \rho V g$

$$= (1.0\times10^3\,kg/m^3)(80\,ft)(30\,ft)(8.0\,ft)(0.3048\,m/ft)^3(9.8\,\frac{m}{s^2})$$

$$= 5.3\times10^6\,N \quad (= \text{force on bottom})$$

(b) Pressure at bottom $= \rho g h = (1.0\times10^3\,kg/m^3)(9.8\,\frac{m}{s^2})(8.0\,ft)(0.3048\,m/ft)$

$$= 2.39\times10^4\,N/m^2$$

Average pressure on sides $= \frac{1}{2}(2.39\times10^4\,N/m^2)$

Area of side $= (80\,ft)(8.0\,ft)(0.3048\,m/ft)^2 = 59.46\,m^2$

Force on side $= \frac{1}{2}(2.39\times10^4\,N/m^2)(59.46\,m^2) = 7.1\times10^5\,N$.

(c) Force on end $= \frac{1}{2}(2.39\times10^4\,\frac{N}{m^2})(30\,ft)(8.0\,ft)(0.3048\,m/ft)^2$

$$= 2.7\times10^5\,N.$$

(3) Assume entire volume of can in submerged

$$\text{Buoyant force} = \rho V g = \left(1.00 \times 10^3 \frac{kg}{m^3}\right)\left(1200 \times 10^{-6}\, m^3\right)\left(9.8 \frac{N}{kg}\right)$$

$$= 11.76\,N$$

$$\text{Floating weight} = (m_{can} + m_{lead})\, g = 11.76\,N$$

$$m_{can} + m_{lead} = 1.200\,kg$$

$$m_{lead} = 1.200\,kg - 0.130\,kg = 1.070\,kg$$