Homework - 9 chp13 [3,4,9,15,30,35,48,88]

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Q3] The mass is found from the density of gold & the volume of gold

$$m = \rho V = (19.3\times10^3\,kg/m^3)(0.56m)(0.28m)(0.22m)$$
$$= \boxed{670\,kg \approx 1500\,lb}$$

Q4] Density is that of water & that your mass is 75 kg.

$$V = \frac{m}{\rho} = \frac{75\,kg}{1.00\times10^3\,kg/m^3} = \boxed{7.5\times10^{-2}\,m^3 = 75L}$$

Q9] a] The pressure exerted on the floor by the chair leg is caused by the chair pushing down on the floor

$$P_{chair} = \frac{W_{leg}}{A} = \frac{\frac{1}{4}(66kg)(9.80m/s^2)}{(0.020cm^2)\left(\frac{1m}{100cm}\right)^2}$$
$$= \boxed{8.085\times10^7\,N/m^2}$$
$$\approx \boxed{8.1\times10^7\,N/m^2}$$

b] for elephant

$$P_{elephant} = \frac{W_{elephant}}{A} = \frac{(1300kg)(9.80m/s^2)}{(800cm^2)\left(\frac{1m}{100cm}\right)^2}$$

$$= \boxed{1.59\times10^5\,N/m^2}$$
$$\approx \boxed{2\times10^5\,N/m^2}$$

15] a] The absolute pressure is given by,

$P = P_0 + \rho g h = 1.013 \times 10^5 N/m^2 + (1.00 \times 10^3 kg/m^3)(9.80 m/s^2)(1.8 m)$

$= \boxed{1.189 \times 10^5 N/m^2}$

$\approx \boxed{1.2 \times 10^5 N/m^2}$

$F = PA = (1.189 \times 10^5 N/m^2)(28.0 m)(8.5 m)$

$= \boxed{2.8 \times 10^7 N}$

b] pressure side of the pool, near the bottom will be same as pressure at the bottom

$\boxed{P = 1.2 \times 10^5 N/m^2}$

30] Difference in the actual mass & the apparent mass is the mass of the water displaced by the leg.

$m_{actual} - m_{apparent} = \Delta m = \rho_{water} V_{legs} = \rho_{water} \frac{m_{legs}}{\rho_{legs}} = 2 m_{leg} \rightarrow m_{leg} = \frac{1}{2} \Delta m =$

$\frac{1}{2}(74 kg - 54 kg) = \boxed{10 kg}$

35] $F_{buoyant} = W_{ice} \rightarrow m_{sea\ water}\, g = m_{ice}\, g \rightarrow$

$m_{sea\ water} = m_{ice} \rightarrow \rho_{seawater} V_{seawater} =$

$\rho_{ice} V_{ice} \rightarrow (SG)_{seawater} \rho_{water} V_{submerged}$

$= (SG)_{ice} \rho_{water} V_{ice} \rightarrow (SG)_{seawater}$

$V_{submerged\ ice} = (SG)_{ice} V_{ice} \rightarrow V_{submerged\ ice}$

$= \frac{(SG)_{ice}}{(SG)_{seawater}} V_{ice} = \frac{0.917}{1.025} V_{ice} = 0.895 V_{ice}$

Thus the fraction

$V_{above} = V_{ice} - V_{submerged} = 0.105\, V_{ice}$ or $\boxed{10.5\%}$

48] $(AV)_{hose} = \frac{V_{pool}}{t} \rightarrow t = \frac{V_{pool}}{A_{hose} v_{hose}}$

$$= \frac{\pi (3.05m)^2 (1.2m)}{\pi \left[\frac{1}{2} \left(\frac{5}{8}\right)'' \left(\frac{1m}{39.37''}\right) \right]^2 (0.40m/s)} = \boxed{4.429 \times 10^5 S}$$

$4.429 \times 10^5 s \left(\frac{1\ day}{60 \times 60 \times 24 s} \right) = \boxed{5.1\ days}$

88] $F_{buoyant} = V_{displaced}\, \rho_{sea\ water}\, g = m_{fresh}\, g \rightarrow m_{fresh}$

$= (2240 m^2)(8.50m)(1025 kg/m^3) = \boxed{1.95 \times 10^7 kg}$

So in terms of a volume

$V_{fresh} = \frac{m_{fresh}}{\rho_{fresh}} = \frac{1.95 \times 10^7 kg}{1.00 \times 10^3 kg/m^3} = \boxed{1.95 \times 10^4 m^3} = \boxed{1.95 \times 10^7 L}$