p281 1, 9, 10, 17, 20, 23, 24, 25, 29, 30

① $\rho_{granite} = 2.7 \times 10^3\ kg\,m^{-3}$

$\rho = \frac{m}{V}$

$m = \rho V = (2.7 \times 10^3\ kg\,m^{-3})(10^8\ m^3) = \underline{2.7 \times 10^{11}\ kg}$

⑨ $P = \frac{F}{A}$

(a) $F = PA = (101.3 \times 10^3\ Pa)(1.6m)(2.9m) = \underline{4.7 \times 10^5\ N}$

(b) $\underline{4.7 \times 10^5\ N}$

⑩ 1 mm-Hg = 133 Pa

85 mm-Hg = 11.305×10^3 Pa

$P = P_o + \rho_f g d$

only interested in pressure difference therefore $P_o = 0$

$\Delta d = \frac{\Delta P}{\rho_f g} = \frac{(11.305 \times 10^3\ Pa)}{(1.0 \times 10^3\ kg\,m^{-3})(9.81\ ms^{-2})} = \underline{1.2\ m}$

⑰ (a) $P = P_o + \rho g d$ gauge pressure so $P_o = 0$

$P = \rho g d = (1.0 \times 10^3\ kg\,m^{-3})(9.81\ ms^{-2})(110m \sin 58 + 5m)$

$= \underline{9.6 \times 10^5\ Pa}$

(b) It will shoot up to same level that it came down from.

$110m \sin 58 + 5m = \underline{98\ m}$

(20) (a) $m = \rho V$

$= (1 \times 10^3\ kg\,m^{-3})(\pi(.3 \times 10^{-2}\ m)^2\ 12)$

$= 0.34\ kg$

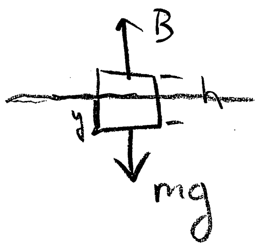
(b) $P_1 = P_2$

$\rho g d = \frac{F_2}{A_2}$

$F_2 = \rho g d A_2 = (1 \times 10^3\ kg\,m^{-3})(9.81\ m s^{-2})(12\ m)(\pi(.21\ m)^2)$

$= \underline{16 \times 10^5\ N}$

(23)



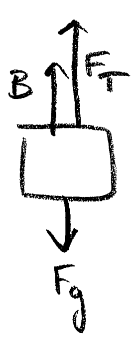
$B = mg$

$\rho_f V_f g = mg$

$\rho_{Hg} \cancel{A} y \cancel{g} = \rho_{Al} \cancel{A} h \cancel{g}$

$\frac{y}{h} = \frac{\rho_{Al}}{\rho_{Hg}} = \frac{2.70 \times 10^3\ kg\,m^{-3}}{13.6 \times 10^3\ kg\,m^{-3}} = \underline{0.199}$

(24) (a)



$F_T + \rho_f V_f g = mg$

$F_T = mg - \rho_f V_f g$ $\qquad \rho = \frac{m}{V}$

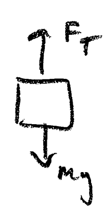
$= m_s g - \rho_f \frac{m_s}{\rho_s} g$

$= \left(1 - \frac{\rho_f}{\rho_s}\right) m_s g$

$= \left(1 - \frac{1.0 \times 10^3\ kg\,m^{-3}}{7.8 \times 10^3\ kg\,m^{-3}}\right)(18000\ kg)(9.81\ m s^{-2})$

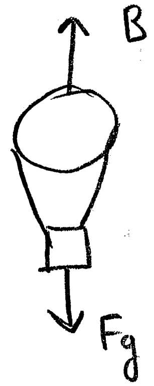
$= \underline{1.5 \times 10^5\ N}$

(b)



$F_T = mg = (18000\ kg)(9.81\ m s^{-2}) = \underline{1.8 \times 10^5\ N}$

(25)



$$B = F_g$$

$$\rho_f V_f \cancel{g} = (m_{He} + m_{balloon} + m_{cargo})\cancel{g}$$

$$m_{cargo} = \rho_f\left(\frac{4}{3}\pi r^3\right) - \rho_{He}\left(\frac{4}{3}\pi r^3\right) - m_{balloon}$$

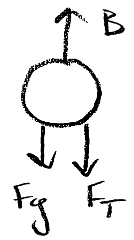
$$= \frac{4}{3}\pi(7.35\,m)^3(1.29\,kg\,m^{-3} - 0.179\,kg\,m^{-3}) - 930\,kg$$

$$= \underline{920\,kg}$$

(29) (a) $B = \rho_f V_f g = (1.025\times10^3\,kg\,m^{-3})\left(\frac{4\pi}{3}\left(\frac{5.20\,m}{2}\right)^3\right)(9.81\,m\,s^{-2})$

$$= \underline{7.40\times10^5\,N}$$

(b)



$$B = F_g + F_T$$

$$F_T = B - F_g = 7.40\times10^5\,N - (74400\,kg)(9.81\,m\,s^{-2})$$

$$= \underline{1.09\times10^4\,N}$$

(30) (a) $B = \rho_f V_f g$

$$= (1.025\times10^3\,kg\,m^{-3})(65.0\times10^{-3}\,m^3)(9.81\,m\,s^{-2})$$

$$= \underline{654\,N}$$

(b) to sink $F_g > B$

$$F_g = mg = (68\,kg)(9.81\,m\,s^{-2}) = 667\,N$$

$\therefore$ <u>diver sinks.</u>