AP 2 C10.1 → .5
3, 8, 11, 13, 17, 19

3)  Backpack is .60m x .25m x .15m = .0225 m^3

$\rho = \frac{m}{V}$ $m = \rho V = (19.3 \times 10^3 \text{ kg/m}^3)(.0225 m^3)$

$m = 434.3$ kg

8)  $m_m = 50$ kg $m_E = 1500$ kg $P = \frac{F}{A}$ $1 m^2 = 1 \times 10^4 cm^2$

$A_m = .05 cm^2$ $A_E = 800 cm^2$

a) $P = \frac{F}{A} = \frac{(50 kg)(9.80 m/s)}{5.0 \times 10^{-6} m^2} = 9.80 \times 10^7 N/m^2$

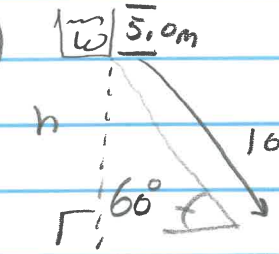
b) $P = \frac{F}{A} = \frac{(1500 kg)(9.80 m/s^2)}{.08 m^2} = 1.838 \times 10^5 N/m^3$

11)  $P_g = 240$ kPA $A_T = 200 cm^2 = .02 m^2$

$P = \frac{F}{A} = \frac{mg}{A}$ $m = \frac{PA}{g} = \frac{(4)(240 \times 10^3 N/m^2)(.02 m^2)}{9.80 m/s^2} = 1959$ kg

13)  $P = \rho h g$ $\rho_{Al} = .79 \times 10^3 kg/m^3$

$h = \frac{P}{\rho g} = \frac{1.00 \times 10^5 N/m^2}{(.79 \times 10^3 kg/m^3)(9.80 m/s^2)} = 12.92 m$

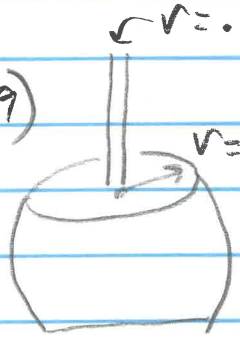
17.) 

$\sin\theta = \frac{o}{h}$ $\quad h \sin\theta = o = 160m \sin 60° = 86.6m$

$h_T = 86.6m + 5m = 91.6m$

A) $P = \rho g h = (1000 kg/m^2)(9.80 m/s^2)(91.6m) = 8.977 \times 10^5 N$

B) water would rise to the height of the tank due to Conservation of Energy

19) 

A) $\rho = \frac{m}{V}$ $\quad m = \rho V = (1000 kg/m^3)(\pi)(.0030m)^2(12.0m)$

$m = .3393 kg$

B) $\frac{F_{out}}{A_{out}} = \frac{F_{in}}{A_{in}}$ $\quad F_{out} = \frac{A_{out} F_{in}}{A_{in}} = \frac{(\pi)(.20m)^2(.3393 kg)(9.80 m/s^2)}{(\pi)(.0030m)^2} = 14778 N$

AP2 C10.6 21, 23, 24, 26, 30

21) 

$A = 2.00\,cm^2 = 2\times10^{-4}\,m^2$ $\quad \%_0 = 22.9cm/25cm = .916$

$M = 45g$ $\quad h = 22.9cm$

$L = 25.0cm = .25m$ $\quad \frac{P_0}{P_F} = \%_0$

$$P_F = \frac{P_0}{\%_0} = \frac{.0450\,kg/(2\times10^{-4}m^2)(.25m)}{.916} = 982\,kg/m^3$$

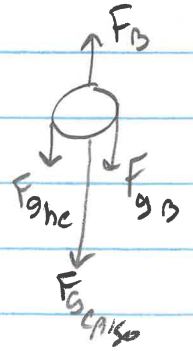
23) $\rho_{Al} = 2.70\times10^3\,kg/m^3$ $\quad \rho_{Hg} = 13.6\times10^3\,kg/m^3$

$$\frac{P_0}{P_F} = \%_0 = \frac{2.70\times10^3\,kg/m^3}{13.6\times10^3\,kg/m^3} = .1985 = 19.85\%$$

24) 

$r_B = 9.5m$ $\quad V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(9.5m)^3 = 3591.4m^3$

$m_{BA} = 1000kg$ $\quad \rho = \frac{m}{V}$



$$-F_B + F_{g\,He} + F_{g\,B_{Al}} + F_{g\,Cargo} = 0$$

$$F_{Cargo} = F_B - F_{g\,He} - F_{g\,B} = \rho_{Air}V_{Air}g - \rho_{He}V_{He}g - m_{B_{Al}}g$$

$$m_C = (1.29\,kg/m^3)(3591.4m^3) - (.179\,kg/m^3)(3591.4m^3) - 1000kg$$

$$m_C = 2991\,kg$$

26) $m_{s_A} = 63.5g = .0635kg$ $\quad F_B = \rho_F V_F g$

$m_{s_W} = 56.4g = .0564kg$ $\quad wt = \rho_o V_o g$

$m_{metal} = ?$

$-m_A g - \rho_F V_F g = m_o g \quad -V_F = \dfrac{m_w - m_A}{\rho_F} = \dfrac{.0564kg - .0635kg}{1000 kg/m^3}$

$V_F = 7.1 \times 10^{-6} m^3 \qquad \rho_o = \dfrac{m_o}{V_o} = \dfrac{.0635kg}{7.1 \times 10^{-6} m^3} = 8.944 \times 10^3 kg/m^3$

COPPER

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30) $SG_{ICE} = .917 = .917 \times 10^3 kg/m^3 = \rho_I$

$SG_{SW} = 1.025 = 1.025 \times 10^3 kg/m^3 = \rho_{SW}$

ICE

$\% = \dfrac{\rho_o}{\rho_F} = \dfrac{.917 \times 10^3 kg/m^3}{1.025 kg/m^3} = .8946$ below (So .1054 above)

File:

Date: AP2 C10. 7-9, 35, 36, 40, 38, 43

Meeting Minutes/Notes

BAS Brighton Area Schools

Topic/Presenter:

Action/Comments:

$A_{pipe} = \pi r^2 = \pi(.17m)^2 = .09079 m^3$

35) $\frac{V_{air}}{5} = \frac{9.2m \times 5.0m \times 4.5m}{10 min} = \frac{207 m^3}{600 s} = \frac{.345 m^3}{5} \times 1000 kg/m^3 = 345 kg/s$

$= \square$ $\quad RATE = \rho A v \quad v = \frac{rate}{\rho A} = \frac{345 kg/s}{(1000 kg/m^3)(.09079 m^3)} = 3.80 m/s$

36) $A_{pool} = \pi r^2 h = \pi(3.6m)^2(1.5m) = 61.07 m^3$

$v_{water} = .28 m/s \quad Flow = \rho A v = (1000 kg/m^3)(\pi)(.007936m)^2(.28 m/s)$

$d_H = 5/8 in = 1.5875 cm \quad r_h = .007936 m \quad Flow = .05540 kg/s$

$\Delta t = \frac{(61.07 m^3)(1000 kg/m^3)}{.05540 kg/s} = 1.102 \times 10^6 s = 13.03 days$

40) $A = 80 m^2 \quad v_T = 340 m/s \quad v_B = 290 m/s$

$P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2 \quad P_1 - P_2 = NET\ Pressure$

$P_N = \frac{1}{2}\rho(v_1^2 - v_2^2) = \frac{1}{2}(1.29 kg/m^3)((340 m/s)^2 - (290 m/s)^2) = 2.0318 \times 10^4 N/m^2$

$P = \frac{F}{A} \quad F = PA = (2.032 \times 10^4 N/m^2)(80 m^2) = 1.625 \times 10^6 N$

38) $d = 1.60 cm \quad r = .00800 m \quad h = 12.0 m$

Flow rate = ? $\quad Flow = Av$ (ρ constant) $\quad P_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2$

$P_1 + 0 + \rho g y = P_2 + \frac{1}{2}\rho v_2^2 + 0 \quad v = \sqrt{2gy} = \sqrt{2(9.80 m/s^2)(12.0 m)} = 15.34 m/s$

$Flow\ rate = Av = \pi(.00800 m)^2(15.34 m/s) = 3.08 \times 10^{-3} m^3/s$

#43) $P_1 = 3.8\ atm = 3.8494 \times 10^5\ N/m^2$ $V_2 = ?$

$V_1 = .60\ m/s$

$r_1 = 2.5\ cm = .0250\ m$ $r_2 = 1.3\ cm = .013\ m$

$P_{1Abs} = 4.8624 \times 10^5\ N/m^2$ $h = 20\ m$

$$P_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2 \qquad A_1 v_1 = A_2 v_2$$

A) $$v_2 = \frac{A_1 v_1}{A_2} = \frac{\pi (.0250m)^2 (.60 m/s)}{\pi (.013m)^2} = 2.219\ m/s$$

B) $$P_2 = P_1 + \frac{1}{2}\rho (v_1^2 - v_2^2) + \rho g (y_1 - y_2)$$

$$P_2 = 4.8624 \times 10^5\ N/m^2 + \frac{1}{2}\left(1000\ kg/m^3\right)\left((.60\ m/s)^2 - (2.219\ m/s)^2\right) +$$

$$\left(1000\ kg/m^3\right)\left(9.80 m/s^2\right)(0m - 20m)$$

$$P_2 = 2.8796 \times 10^5\ N/m^2$$

$$P_{Abs} - 1\ ATM = P_{gauge} = 2.880 \times 10^5\ N/m^2 - 1.013 \times 10^5\ N/m^2 = 1.867 \times 10^5\ N/m^2$$