

PLAYS 408

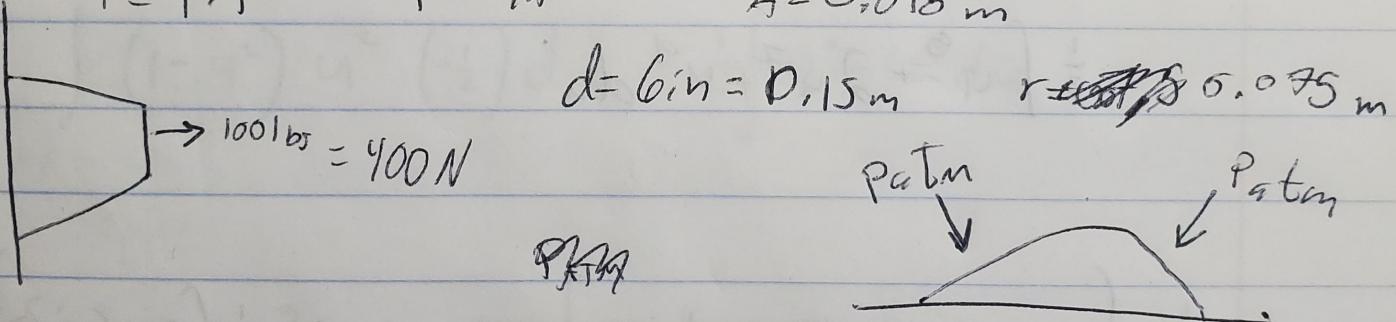
$$D(x, t) = -\sin \left(\cancel{\frac{2\pi}{20}x} + \frac{2\pi}{20}x + 2\pi t \right)$$
$$Assy(Kx \pm \omega t + \phi)$$

$$v = 20 \text{ m/s} \quad \lambda = \frac{\lambda}{f} \quad f = 1 \text{ Hz} \quad \lambda = \frac{v}{f}$$

$$F = PA$$

$$P = F/A$$

$$A = 0.018 \text{ m}$$



$$400 = (101,300 - P_s)(0.018)$$

$$400 = 1823.4 - 0.018 P_s$$

$$0.018 P_s = 1423.4 \quad P_s = 79,077.8 \text{ Pa} = \boxed{1.47 \text{ psig}}$$

4.

$$f_c = f_p \left(\frac{V - V_c}{V + V_p} \right)$$

$$f_r = f_c \left(\frac{V + V_p}{V - V_c} \right)$$

$$f_r = f_p \left(\frac{V + V_c}{V} \right) \left(\frac{V}{V - V_c} \right) \quad f_r = \frac{f_p (V + V_c)}{V - V_c}$$

$$f_r V - f_r V_c = f_p V + f_p V_c$$

$$V_c = \frac{f_r V - f_p V}{f_p + f_r}$$

$$f_r V - f_p V = f_p V_c + f_p V_c$$

5.

$$A = 0.06 \text{ in}^2$$

$$= 0.00004 \text{ m}^2$$

$$\frac{V}{t} = \frac{\text{sq gal}}{50s}$$

$$\frac{\text{sq ft}}{50s} = \frac{\text{m}^3}{264.17 \text{ gal}}$$

$$10 \quad \ddot{x} = -9.8 t^2 + \sqrt{t} + 6$$

$$0.00038 = A_1 V_1 = A_2 V_2 \quad V_2 = 19.8 \text{ m/s}$$

$$V_2 \approx 20 \text{ m/s}$$

$$\frac{S}{50s} = \frac{\text{m}^3}{264.17}$$

$$0.00038 \text{ m}^3/\text{s}$$

$$0.00004 V_1 = A_2 V_2$$

14

14

~~t = 1.01 s~~

$$0.00038 = A_2 \text{ (14)}$$

$$A_2 = 0.00002 \text{ m}^2$$

~~$$\frac{0.00002}{0.00004} = 0.5$$~~

$$0 = V_1^2 - 2a_1 y$$

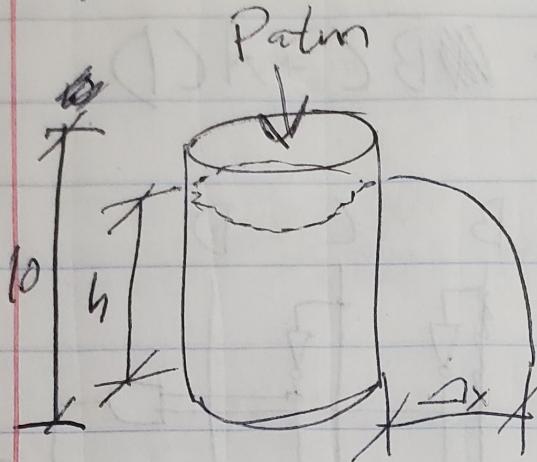
$$\frac{A_2}{A_1} = \frac{V_1}{V_2} \quad \frac{1.91}{14}$$

$$V_1 = \sqrt{2a_1 y}$$

$$= 0.136$$

cover 86.4%

7.



$$x_f = V_{\text{initial}} t + x_i$$

$$\Delta x = Vt$$

~~Δx = Vt~~

~~Δx = Vt~~

$$P_2 = P_{\text{atm}} + \rho gh$$

$$0 = -4.9 t^2 + h$$

~~h + 4.9 t^2~~ ~~4.9 t^2~~ ~~h~~

$$h = 4.9 t^2$$

$$P_2 = P_{\text{atm}} + \rho g (10 - h)$$

$$P = \frac{\text{Volume}}{\text{Area}}$$

$$P_1 + \frac{1}{2} \rho V_1^2 + \rho gh_1 = P_2 + \frac{1}{2} \rho V_2^2 + \rho g h_2$$

$$P_1 + \rho g (10 - h) = P_2 + \frac{1}{2} \rho V_2^2$$

$$\rho g (10 - h) = \frac{1}{2} \rho V_2^2 \quad g(10 - h) = \frac{1}{2} V_2^2$$

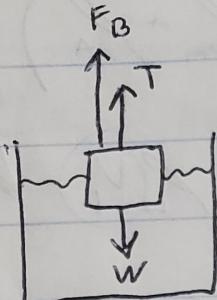
$$V = V_2 = \sqrt[3]{2g(10 - h)}$$

$$t = \sqrt{\frac{h}{4.9}} \quad \Delta x = Vt$$

$$\boxed{\Delta x = \sqrt{2g(10 - h)} \sqrt{\frac{h}{4.9}}}$$

11.16 psi

3.



$$w = F_B + T$$

$$T = w - F_B$$

$$T_w = \rho_B g V_B - \rho_w g V_w$$

$$T_A = \rho_B g V_B - \rho_A g V_A$$

$$\frac{\rho_B g V_B}{V_B g} = T_A + \frac{\rho_A g V_A}{V_B g}$$

$$T_A = T_w + 20$$

$$\rho_B g V_B = \rho_B g V_B + 20 - \rho_A g V_A$$

$$\rho_w g V_B + T_w = \rho_A g V_B + T_A$$

$$120 = \rho_B g (V_B) - \rho_A g (V_B)$$

$$\rho_w g V_B - \rho_A g V_B = T_A - T_w \quad \rho_B g V_B = 120 + \rho_A g (V_B)$$

$$T_w + \rho_w g V_w$$

$$\rho_B = \frac{120 + \rho_A g V_B}{g V_B}$$

$$V_B (\rho_w - \rho_A) = T_A - T_w$$

$$V_B = \frac{T_A - T_w}{g(\rho_w - \rho_A)}$$

$$\rho_B = \frac{T_w + \rho_A g V_B}{\frac{T_A - T_w}{g(\rho_w - \rho_A)} V_B}$$

$$\boxed{\rho_B = 2020.4 \text{ kg/m}^3}$$

$$6. \quad F_B = g \rho V_{rd} \quad F_B = m_B g$$

$$V_B = \left(\frac{V_L + V_A}{0.75} \right) \quad V_{pm} = \frac{1}{4} \left(\frac{V_L + V_A}{0.75} \right)$$

$$m = (\rho_{pm} V_{pm} + \rho_L V_{dL} + \rho_a V_{da})$$

$$V_B = 4/3(V_L + V_A)$$

$$\rho_B V_B = \rho_{pm} V_{pm} + \rho_L V_L + \rho_a V_a$$

$$\rho_B \left(\frac{V_L + V_A}{0.75} \right) = \rho_{pm} \left(\frac{1}{4} \left(\frac{V_L + V_A}{0.75} \right) \right) + \rho_L V_L + \rho_a V_a$$

$$\frac{\rho_B V_L}{0.75} + \frac{\rho_B V_A}{0.75} = \frac{1}{3} \rho_{pm} V_L + \frac{1}{3} \rho_{pm} V_A + \rho_L V_L + \rho_a V_A$$

$$\rho_B V_L + \rho_B V_A = \left(V_L \left(\frac{1}{3} \rho_{pm} + \rho_L \right) + V_A \left(\frac{1}{3} \rho_{pm} + \rho_a \right) \right) \frac{3}{4}$$

$$\frac{4}{3} \rho_B V_A - \frac{1}{3} \rho_{pm} V_A - \rho_A V_A = \frac{1}{3} \rho_{pm} V_L + \rho_L V_L - 4/3 \rho_B V_L$$

$$V_A \left(\frac{4}{3} \rho_B - \frac{1}{3} \rho_{pm} - \rho_A \right) = V_L \left(\frac{1}{3} \rho_{pm} + \rho_L - \frac{4}{3} \rho_B \right)$$

$$V_A / V_L = \left(\frac{\frac{4}{3} \rho_B - \frac{1}{3} \rho_{pm} - \rho_A}{\frac{1}{3} \rho_{pm} + \rho_L} \right)^{-1}$$

$$\rho_{pm} = 1100$$

$$\rho_B = 934$$

$$\rho_L = 917$$

$$\rho_A = 789$$

$$V_A / V_L = 0.43$$