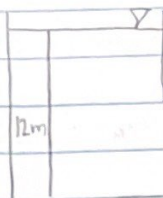


Ch 3 - 41, 62, 83, 90, 94 Ch 4 - 2, 10, 17, 28, 42, 54

41) $p = \gamma_s h$

$p = (10.79 \frac{\text{KN}}{\text{m}^3})(12\text{m})$

$p = 129.48 \text{ kPa}$



62) $p = -\rho_m g h_m - \rho_w g h_w$

$p = -(13.54)(75\text{mm}) - (1)(100\text{mm})$

$-(13.54)(0.075\text{m}) - (1)(0.1\text{m})$

$-1.0155 - 0.1 = -1.1155 \text{ kPa}$



83) 14.2 psia

14.2 psia - atm = psi

14.2 - 14.7 = -0.5 psi

googled conversion

$\frac{2.03602 \text{ inHg}}{1 \text{ psi}} = -1.018 \text{ inHg}$

$1 \text{ psi} = 2.03602 \text{ inHg}$

90) $P_{abs} = P_{gauge} + P_{atm}$

$P_{abs} = -12.6 \text{ psig} + 14.7 \text{ psi} = 2.1 \text{ psi}$

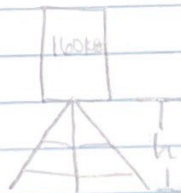
$\frac{2.03602 \text{ inHg}}{1 \text{ psi}} = 4.28 \text{ inHg}$

94) $P_{gmin} = 160 \text{ kPa}$

$p = \rho h g \quad 0^\circ\text{C}$

$160 \text{ kPa} < (1000 \frac{\text{kg}}{\text{m}^3}) h (9.81 \frac{\text{m}}{\text{s}^2})$

$0.0163\text{m} < h$



2) $d = 30 \text{ in}$

$p = 23.6 \text{ psig}$

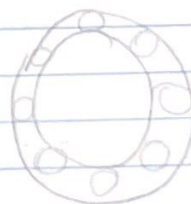
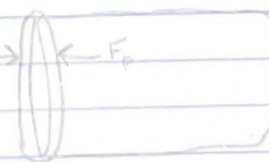
$F = p \cdot A$

$F = (23.6)(\pi(15)^2)$

$F = 16,673.4 \text{ psi}$

$\frac{F}{8}$

$F_0 = 2,084.2 \text{ psi}$



$$\sum F = 0$$

$$\sum M = I \alpha_a$$

$$10) p = \frac{F}{A}$$

$$F = p \cdot A$$

$$d = 500 \text{ mm} \quad h = 1.8 \text{ m}$$

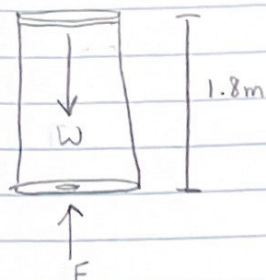
$$r = 0.25 \text{ m}$$

$$p = \gamma h \rightarrow (9.81 \frac{\text{kN}}{\text{m}^3})(1.8 \text{ m}) = 17.658 \text{ kPa}$$

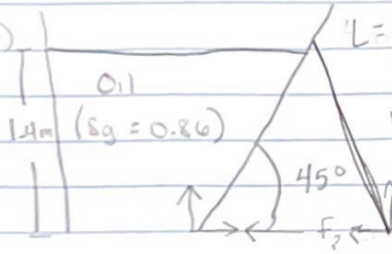
$$F = (17.658 \text{ kPa})(3.22 \text{ m}^2) = 56.9 \text{ kN}$$

$$A = 2\pi rh + 2\pi r^2 \Rightarrow 2\pi(0.25)(1.8) + 2\pi(0.25)^2$$

$$= 3.22 \text{ m}^2$$



17)



$$F_p = \gamma h_c A$$

$$0.86 = \frac{\gamma}{1000} = 860 \frac{\text{kg}}{\text{m}^3}$$

$$h_c = \frac{h}{3} \Rightarrow \frac{1.4}{3} = 0.47 \text{ m}$$

$$F_R = (860)(0.47)(7.92 \text{ m}^2)$$

$$F_R = 3201.269 \text{ N} \approx 32.01 \text{ kN}$$

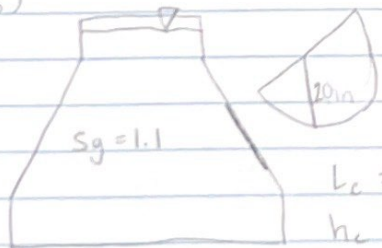
$$\sin 45 = \frac{1.4}{h} = 1.98 \text{ m} \times 4 \text{ m} = 7.92 \text{ m}^2$$

$$L_c = \frac{1.98}{3} = 0.66 \text{ m}$$

$$L_p = \frac{2}{3}(1.98) = 1.32 \text{ m}$$

$$h_p = \frac{2}{3} h \Rightarrow \frac{2}{3}(1.4) = 0.933 \text{ m}$$

28)



$$F = \gamma h_c A$$

$$L_p = L_c + \frac{I_c}{L_c A}$$

$$C = \frac{h(10)}{3\pi} = 8.48 \text{ in}$$

$$A = \frac{\pi r^2}{2} = \frac{\pi(20)^2}{2} = 628.32 \text{ in}^2$$

$$L_c = (8.48) + (8) + \left(\frac{10}{\cos 30^\circ}\right) = 28 \text{ in}$$

$$h_c = L_c \sin 30^\circ = 28 \sin 30^\circ = 14 \text{ in}$$

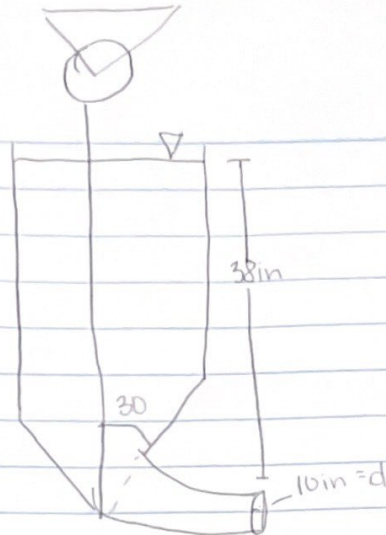
$$F = \gamma h_c A \Rightarrow F = (1.10)(14)(628.32) = 9676.13$$

$$I_c = \frac{\pi}{8} r^4 \Rightarrow \frac{\pi}{8}(20)^4 = 62831.85 \text{ in}^4$$

$$L_p = L_c + \frac{I_c}{L_c A} \Rightarrow (28 \text{ in}) + \left(\frac{62831.85}{28 \cdot 628.32}\right) = 31.6 \text{ m}$$

$$h_p = L_p \sin 30^\circ = (31.6) \sin 30^\circ = 15.8 \text{ m}$$

42)



$$\sin 30 = \frac{10}{20} = w = 5 \text{ in}$$

$$\cos 30 = \frac{h}{5} = h = 4.33 \text{ in}$$

$$\gamma = 62.4 \frac{\text{lb}}{\text{ft}^3}$$

$$h_c = h + 38 \Rightarrow 4.33 \text{ in} + 38 \text{ in} = 42.33 \text{ in} \approx 3.53 \text{ ft}$$

$$A = \frac{\pi d^2}{4} \Rightarrow \frac{\pi (10)^2}{4} = 78.54 \text{ in}^2 \approx 0.54 \text{ ft}^2$$

$$I_c = \frac{\pi (10)^4}{32} = 981.75 \text{ in}^4 \approx 0.0473 \text{ ft}^4$$

$$F = \gamma h_c A \Rightarrow (62.4)(3.53)(0.54) \approx 118.95 \text{ lb}$$

$$\cos 30 = \frac{h_c}{L_c} \rightarrow L_c \cos 30 = h_c$$

$$L_c = \frac{3.53 \text{ ft}}{\cos 30} = 4.08 \text{ ft}$$

$$L_p = \frac{I_c}{L_c A} + L_c = \frac{0.0473 \text{ ft}^4}{(4.08 \text{ ft})(0.54 \text{ ft}^2)} + 4.08 = 4.10 \text{ ft}$$

$$h_p = h_c + \frac{I_c \sin^2 \theta}{h_c A} \Rightarrow 3.53 \text{ ft} + \frac{(0.0473 \text{ ft}^4) \sin^2 30}{(3.53 \text{ ft})(0.54 \text{ ft}^2)} = 3.54 \text{ ft}$$

$$C_p = 42.48 \text{ in} - 38 \text{ in} = 4.48 \text{ in}$$

54)

$$S_g = 0.79$$

$$F_v = 9.81 \left[(2.13)(0.91) - \frac{\pi (0.91)^2}{2} \right] (0.91)$$

$$F_v = 5.69 \text{ kN}$$

$$A_x = A_{\text{rec}} x - \frac{A}{2} \times \frac{x}{2}$$

$$x_v = \left[2.13(0.91) \left(\frac{0.91}{2} \right) - \left(\frac{\pi (0.91)^2}{2} \right) \right] (0.79)(0.91)$$

$$(2.13)(0.91)^2 - \frac{\pi (0.91)^2}{2}$$

$$x_v = 0.1148 \text{ in}$$

