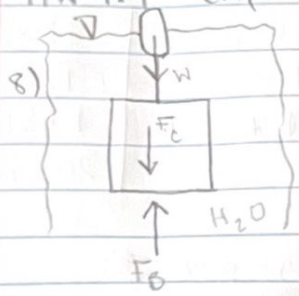
Worked w Elson and Julia

HW 1.4 - chpt 5 - 8, 24, 41, 61

8)



$\gamma_b = 470 \frac{N}{m^3}$ $V = 100^3 mm$ $F_c = 80N$

*assuming in water

$F_B = W_b + F_c$

$F_B = \gamma_b V_b + F_c$

$\rho g V_b = \gamma_b V_b + F_c$

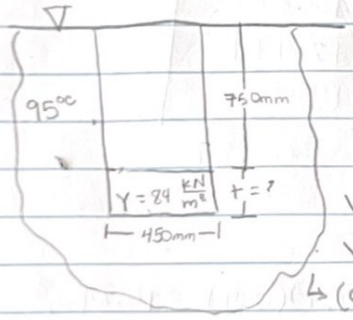
$(1000 \frac{kg}{m^3})(9.81 \frac{N}{m^2}) V_b = (470 \frac{N}{m^3}) V_b + 80N$

$9810 \frac{kgN}{m^5} V_b - 470 \frac{N}{m^3} V_b$

$9340 V_b = 80N$

$V_b = 0.008565 m^3$

24)



$\Sigma F = 0$

$F_b + W_c - W_B = 0$

$V_B = \left(\frac{\pi}{4}(0.45)^2\right) t = 0.159t\ m^3$

$V_c = \left(\frac{\pi}{4}(0.45)^2\right)(0.75) = 0.1193\ m^3$

$V = V_c + V_B = (0.1193) + (0.159)t$

$\gamma_w V = \gamma_c V_c + \gamma_B V_B$

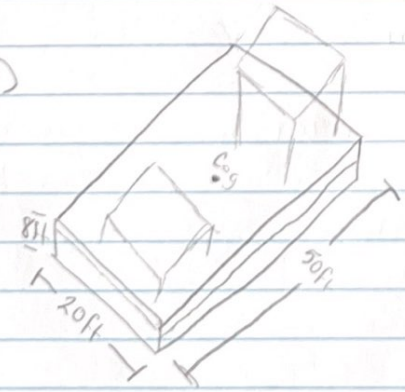
$(9.44)(0.1193 + 0.159t) = (6.456)(0.1193) + (84)(0.159t)$

$1.13kN + 1.501t\ kN = 0.77kN + 13.356t\ kN$

$11.855t = 0.36$

$t = 0.0304m$

41)



D = seawater

$F_b = W_d = W_p = 450,000lb$

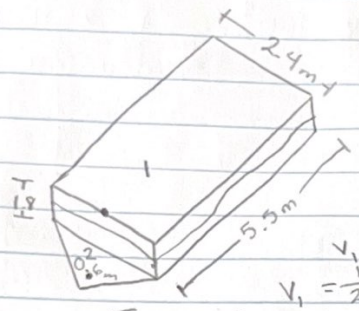
$V_d = \frac{W_d}{D} \Rightarrow \frac{450,000}{64} = 7031.25 ft = 64 \frac{lb}{ft^3}$

$A_p = (50ft)(20ft) = 1000ft^2$

$\frac{7031.25ft}{1000ft^2} = 7.03ft$

yes, because the platform is 1ft above seawater.

(61)



Floating

	V (m^3)	Cog(y)	V · y
1	15.84	1.2	19.008
2	3.96	0.4	1.584
Total	19.8		20.592

$V_1 = (2.4)(5.5)(1.8-0.6) = 15.84\,m^3$

$V_1 = \frac{1}{2}bhL \Rightarrow \frac{1}{2}(2.4)(0.6)(5.5)$

$CoG = \frac{\sum(y \cdot v)}{\sum v} \Rightarrow \frac{20.592}{19.8} = 1.04m$

Submerged

	V	Buoyancy (y)	y · V
1	11.88	1.05	1.584
2	3.96	0.4	12.474
Total	15.84		14.058

$CoB = \frac{\sum(y \cdot V)}{\sum v} \Rightarrow \frac{14.058}{15.84} = 0.8875m$

$MB = \frac{I}{V_d}$

$V_d = \frac{1}{2}(2.4)(0.6)(5.5) + (5.5)(2.4)(0.9) = 15.84\,m^3$

$I = \frac{LB^3}{12} \Rightarrow \frac{(5.5)(2.4)^3}{12} = 6.336\,m^4$

$MB = \frac{(6.336\,m^4)}{15.84\,m^3} = 0.4m$

$y_{MC} = y_{MB} + y_{BC} = 0.8875 + 0.4 = 1.2875m$

$MC > CoG \Rightarrow \therefore$ Boat is stable