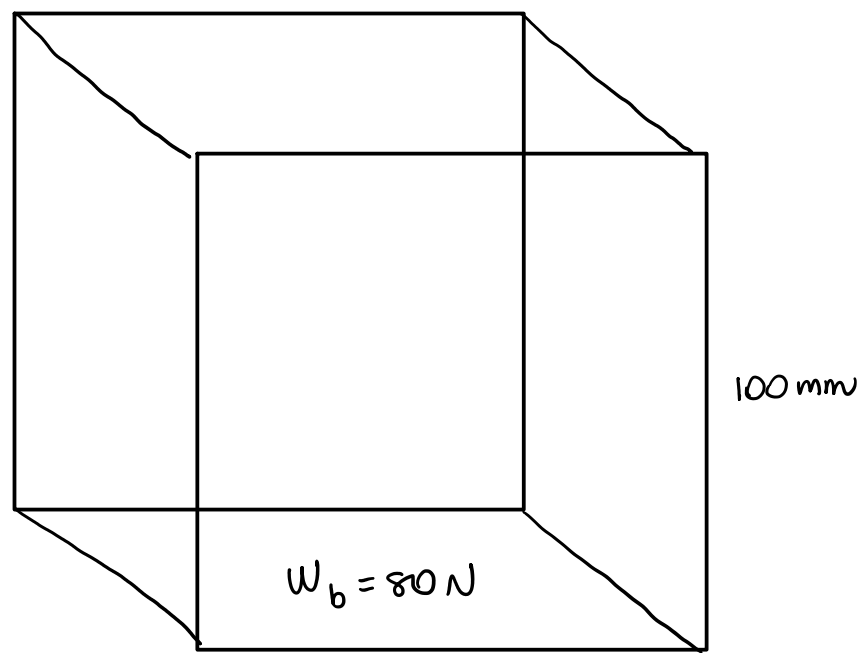


Hw 1.4

julia de camargo gurso
Elson Edmox
Amica Lucas

5.8



$\sum F_V = 0$

$F_B + F_F - w_B - w_F = 0$

$F_B = \gamma V$

$w = \gamma V$

$F_B = \gamma V = 9790 \text{ N/m}^3 \cdot 100 \text{ mm}^3 \left(\frac{1 \text{ m}^3}{1000000000 \text{ mm}^3} \right) = 9.79 \text{ N}$

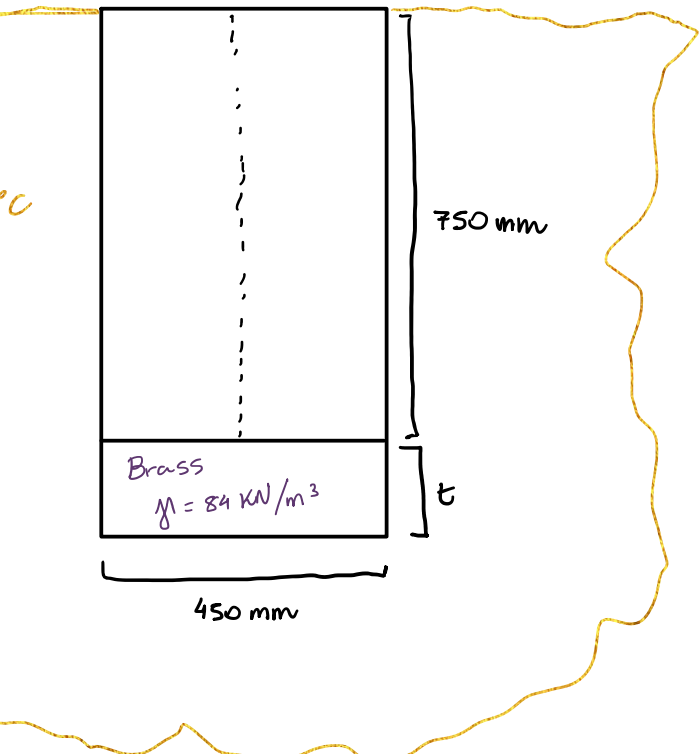
$9.79 + \gamma V_F - 80 \text{ N} - \gamma_F V_F = 0$

$\gamma_F V_F - \gamma_F V_F = 80 \text{ N} - 9.79 = 70.21 \text{ N}$

$V_F (\gamma_f - \gamma_F) = 70.21 \text{ N}$

$V_F = \frac{70.21}{(9790 - 470)} = 0.0075 \text{ m}^3$

5.24



$\sum F = 0$

$F_b - w_c - w_B = 0$

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

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

$V = V_C + V_B = 0.1193 + 0.159 \text{ t}$

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

$(9.44)(0.1193 + 0.159 \text{ t}) = (6.456)(0.1193) + (84)(0.159 \text{ t})$

$1.13 \text{ kN} + 1.50 \text{ t kN} = 0.77 \text{ kN} + 13.356 \text{ t kN}$

$13.356 \text{ t} - 1.50 \text{ t} = 1.13 - 0.77$

$11.855 \text{ t} = 0.36$

$t = 0.36 / 11.855$

$t = 0.0304 \text{ m}$

5.41

$F_b = V_d = V_p = 450000 \text{ lbs}$

$V_d = W_d / \rho \Rightarrow \frac{450000}{64} = 7031.25 \text{ ft}^3 = 6411600 \text{ in}^3$

$A_p = 50 \text{ ft} \times (20 \text{ ft}) = 1000 \text{ ft}^2$

$7031.25 / 100 = 70.31 \text{ ft}$

Yes, Plot form is still 1' left of platform

(61)

Floating

	V (m³)	CoG (y)	V · y
1	15.94	1.2	19.008
2	3.96	0.4	1.584
Total	19.8		20.592

$V_c = (2.4)(5.5)(1.2 - 0.6) = 15.84 \text{ m}^3$

$V_f = \frac{1}{2} b h L \Rightarrow \frac{1}{2} (2.4)(0.6)(5.5)$

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

Submerged

	V	Buoyancy (y)	y · V
1	11.88	1.05	1.584
2	3.96	0.4	1.2474
Total	15.84		14.058

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

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

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

$I = \frac{b h^3}{12} \Rightarrow \frac{(5.5)(2.4)^3}{12} = 6.336 \text{ m}^4$

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

$y_{MC} = y_{MB} + y_{CoC} = 0.8875 + 0.4 = 1.2875 \text{ m}$

$\text{MC} > \text{CoG} \Rightarrow \therefore \text{Boat is stable}$