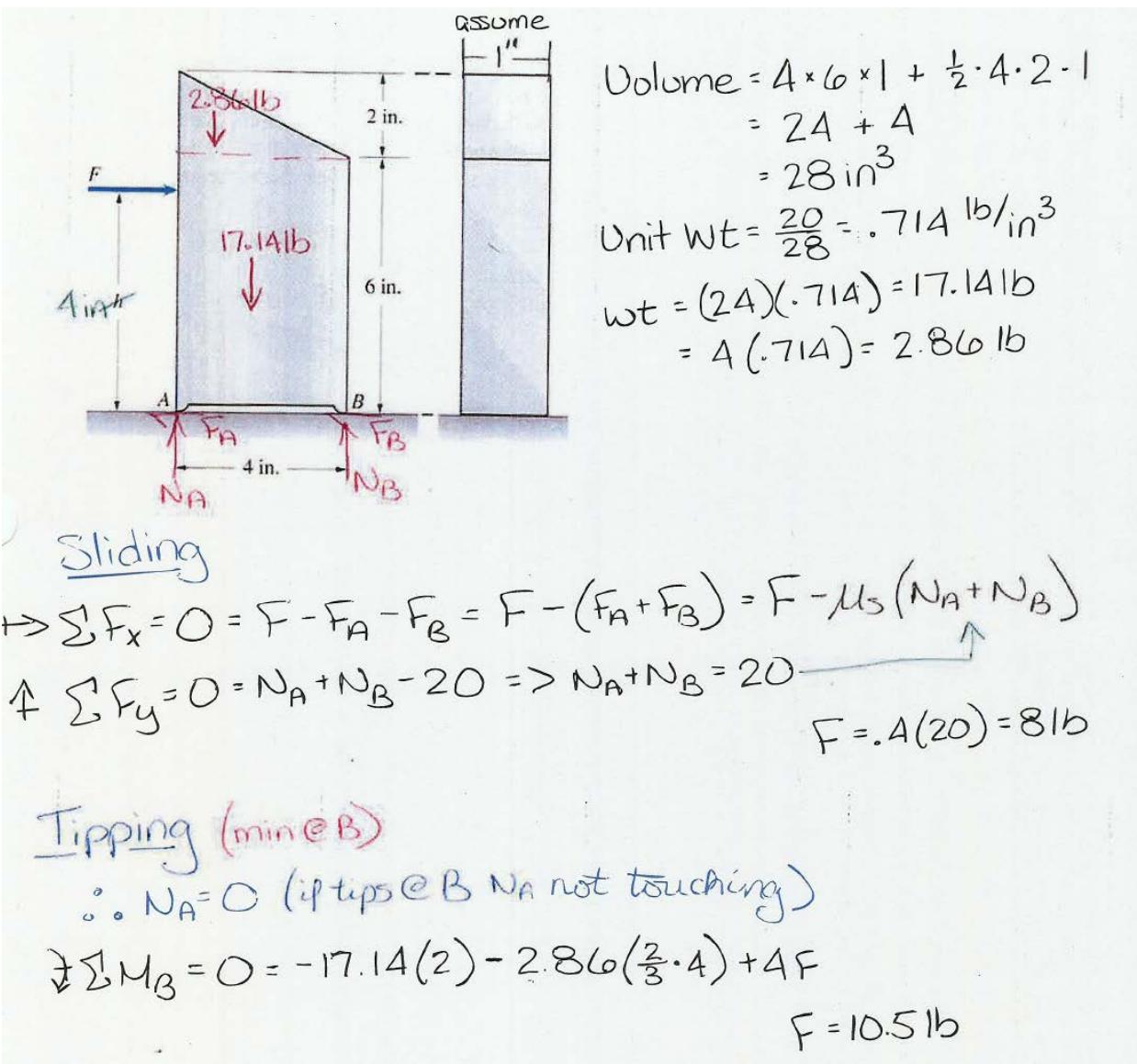**Problem 3:** Determine the largest force *F* to cause impending motion. The 20-lb object is supported at *A* and *B*. The distance $h = 4$ in. $\mu_s = 0.4$

assume

Volume $= 4 \times 6 \times 1 + \frac{1}{2} \cdot 4 \cdot 2 \cdot 1$

$\quad = 24 + 4$

$\quad = 28$ in^3

Unit Wt $= \frac{20}{28} = .714$ lb/in^3

wt $= (24)(.714) = 17.14$ lb

$\quad = 4(.714) = 2.86$ lb

Sliding

$\Rightarrow \Sigma F_x = 0 = F - F_A - F_B = F - (F_A + F_B) = F - \mu_s(N_A + N_B)$

$\uparrow \Sigma F_y = 0 = N_A + N_B - 20 \Rightarrow N_A + N_B = 20$

$F = .4(20) = 8$ lb

Tipping (min @ B)

$\therefore N_A = 0$ (if tips @ B N_A not touching)

$\Sigma M_B = 0 = -17.14(2) - 2.86(\frac{2}{3} \cdot 4) + 4F$

$F = 10.5$ lb

ANSWER: Sliding = 8.00 lbs, Tipping = 10.00 lbs
Thus object will slide at force of 8.00 lbs