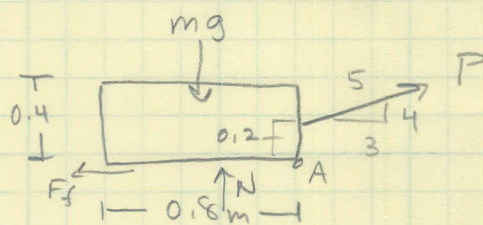
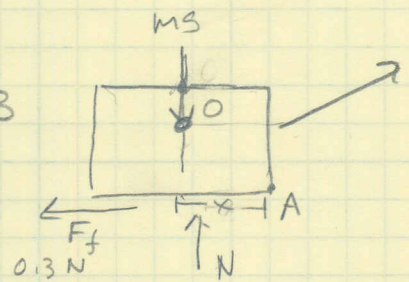


8-2



$$\mu_s = 0.3$$



$$\sum F_x = 0 \quad \frac{3}{5}P - 0.3N = 0$$

$$\sum F_y = 0 \quad N - 40(9.81) + \frac{4}{5}P = 0$$

$$N = 40(9.81) - \frac{4}{5}P; \quad N = 392.4 - \frac{4}{5}P$$

$$\text{Substitute: } \frac{3}{5}P - 0.3 \left[392.4 - \frac{4}{5}P \right]$$

$$P = 140 \text{ N}, \quad N = 392.4 - \frac{4}{5}(140) = 280.3 \text{ N}$$

Find distance from A for N:

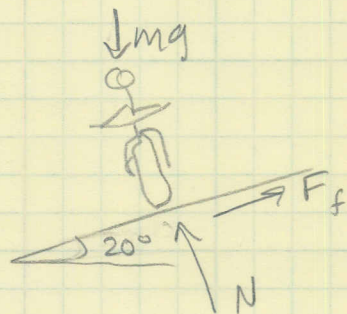
$$\sum M_o = N(x) - 200(0.3N) + 400 \left(P \frac{4}{5} \right) = 0$$

$$280.3(x) = 16818 - 44800$$

$$x = \frac{-27982}{280.3} = 99.8 \text{ mm to the left of middle}$$

$$\text{from A; } 400 + 100 = \boxed{500 \text{ mm from A}}$$

8-9



$$\sum F_y = 0 \quad N - 180(9.81) \cos 20^\circ = 0$$

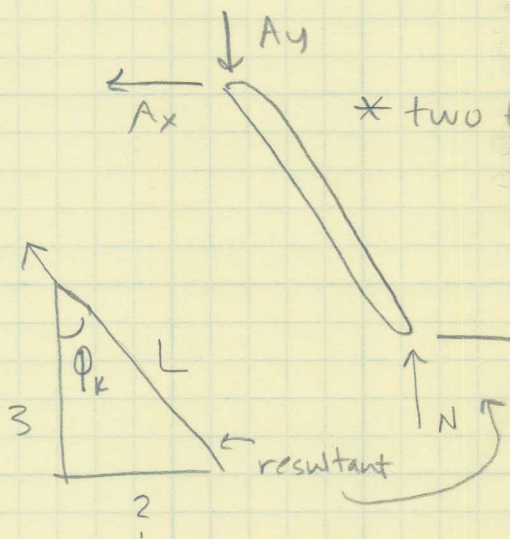
$$N = 1659 \text{ N}$$

$$\sum F_x = F_f - 180(9.81) \sin 20^\circ = 0$$

$$F_f = 604 \text{ N}$$

$$F_f = \mu_s N = 0.4(1659) = 664 \text{ N}$$

$\boxed{\text{No, motorcycle will not slip}}$

8-34 Find largest L for brace, $\mu_s = 0.5$ * two force member - use resultant to find ϕ_k

$$\phi_k = \tan^{-1} \frac{F_f}{N} = \tan^{-1} \frac{\mu_s N}{N}$$

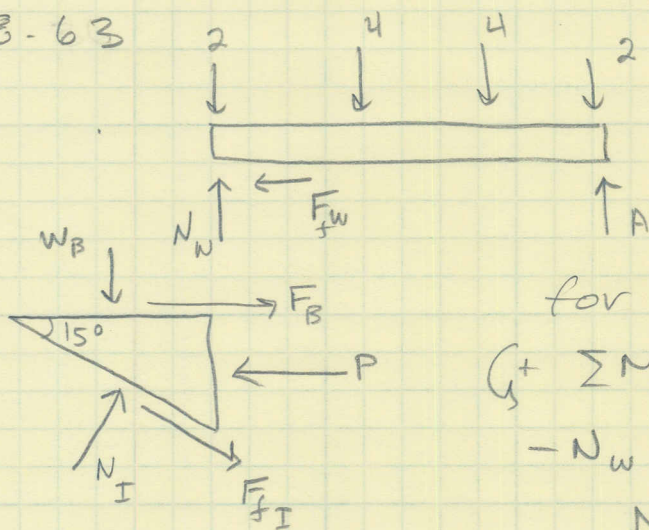
$$= \tan^{-1} \mu_k$$

$$\phi_k = \tan^{-1} 0.5 = 26.57^\circ$$

$$\cos \theta = \frac{3}{L} = \cos 26.57 = \frac{3}{L}$$

$$L = 3.35 \text{ ft}$$

8-63



for beam:

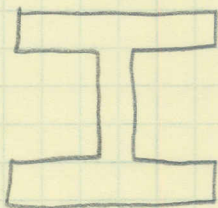
$$\sum M_a = 0$$

$$-N_w(8) + 2(8) + 4(5) + 4(3) = 0$$

$$N_w = 6 \text{ kN}$$

$$F_{fw} = (0.25)(6 \text{ kN}) = 1.5 \text{ kN}$$

$$W_B, F_B = N_w, F_w = 6 \text{ kN}, 1.5 \text{ kN}$$



for wedge:

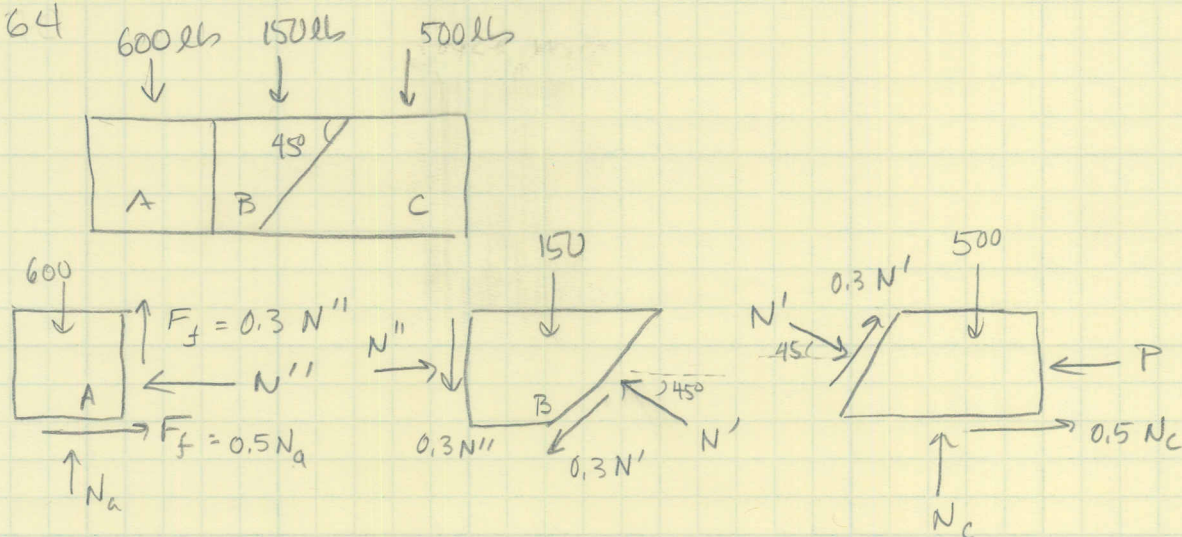
$$\sum F_y = 0, N_I \cos 15^\circ - 6 - 0.25 N_I \sin 15^\circ = 0$$

$$N_I = 6.658 \text{ kN}, F_{fI} = 0.25(6.658) = 1.664 \text{ kN}$$

$$\sum F_x = 0; 1.5 + 1.664 \cos 15^\circ + 6.658 \sin 15^\circ - P = 0$$

$$P = 4.83 \text{ kN}$$

8-64



Assume the whole thing moves

$$\sum F_x = F_f - P = 0$$

$$\mu N = P = 0.5(600 + 150 + 500) = 625 \text{ lb}$$

assume Block B slips up, block A does not move

Block A:

$$\sum F_x = 0 \quad F_A - N'' = 0$$

$$\sum F_y = 0 \quad N_a - 600 + 0.3 N'' = 0$$

Block B:

$$\sum F_x = 0 \quad N'' - N' \cos 45^\circ - 0.3 N' \sin 45^\circ = 0$$

$$\sum F_y = 0 \quad N' \sin 45^\circ - 0.3 N' \cos 45^\circ - 150 - 0.3 N'' = 0$$

Block C:

$$\sum F_x = 0 \quad 0.3 N' \cos 45^\circ + N' \cos 45^\circ + 0.5 N_c - P = 0$$

$$\sum F_y = 0 \quad N_c - N' \sin 45^\circ + 0.3 N' \sin 45^\circ - 500 = 0$$

substitute & solve: $N'' = 629 \text{ lb}$ $N' = 684.3 \text{ lb}$

$$N_a = 411.3 \text{ lb}$$

$$N_c = 838.7 \text{ lb} \quad P = 1048 \text{ lb}$$

 $P = 1048$ for sliding block B $P = 625$ everything slipsso all blocks slip at same time $\Rightarrow P = 625 \text{ lb}$
First