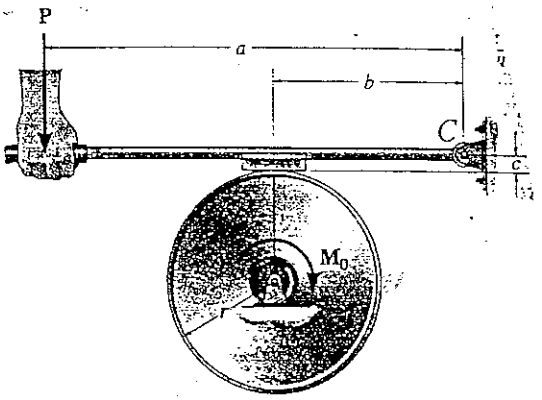
AVE 210 | HOMEWORK #4 | 1/1

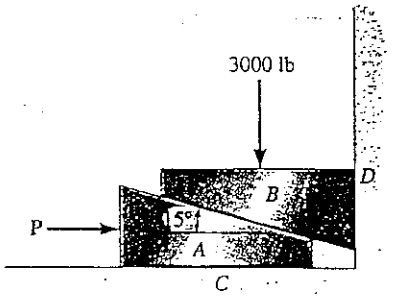
APR 3, 2002 — APR 12, 2002

8-10. The block brake is used to stop the WHEEL FROM rotating when the wheel is subjected to a couple MOMENT M_O. If the coefficient of static friction between the WHEEL and the block is μ_s, determine the smallest force P THAT should be applied.



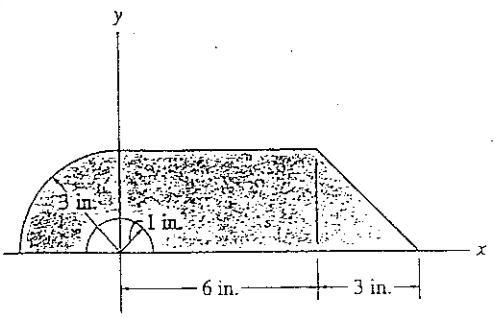
Probs. 8–10/11/12

8-67. Determine the reversed horizontal force $-\mathbf{P}$ needed to pull out wedge A. The coefficient of static friction between A and C and between B and D is $\mu_s = 0.2$, and between A and B $\mu'_s = 0.1$. Neglect the weight of each wedge.



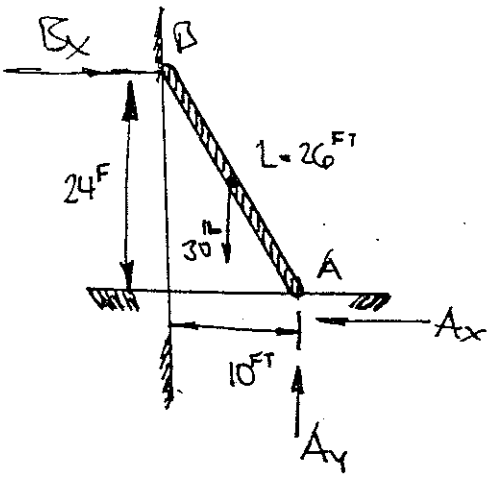
Probs. 8–66/67

56. Locate the centroid $(\bar{x}, \bar{y})$ of the shaded area.



Prob. 9–56

PROBLEM 8-3:



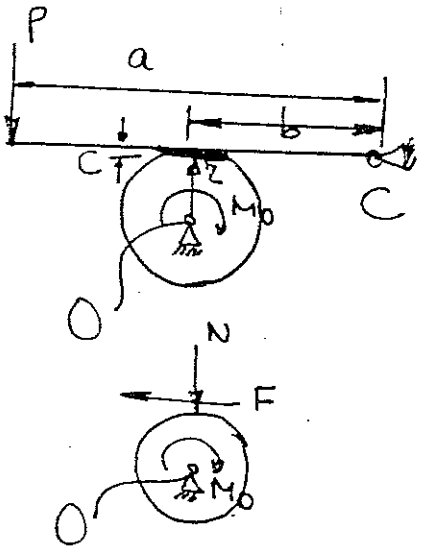
$\Sigma F_Y = 0, \quad A_Y = 30^{lb}$

$\Sigma M_B = 0, \quad 5*30 + 24A_X = 10A_Y = 300$

$$A_X = \frac{150}{24} = 6.25$$

$$\frac{A_X}{A_Y} = \frac{6.25}{30} = 0.208 < \mu_S \longrightarrow \text{NO MOVEMENT}$$

PROBLEM 8-10:



$\Sigma M_C = 0$ FOR HORIZONTAL BAR:

$$bN = aP + F_C$$

$$N = \frac{a}{b}P + \frac{c}{b}F$$

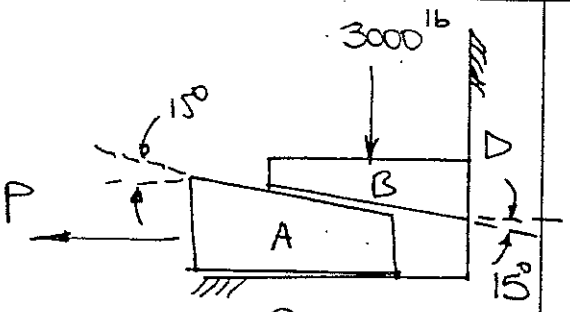
$\Sigma M_O = 0$ FOR CIRCULAR WHEEL:

$$rF = M_O \overset{①}{=} r\mu N = r\mu\frac{a}{b}P + r\mu\frac{c}{b}F = r\mu\frac{a}{b}P + \mu\frac{c}{b}M_O \quad ②$$

$$\left.\begin{matrix}① \\ \& \\ ②\end{matrix}\right\} \frac{M_O\left(1-\mu\frac{c}{b}\right)}{r\mu\frac{a}{b}} = P$$

OR $$P = \frac{M_O}{r\mu a}(b - \mu c)$$

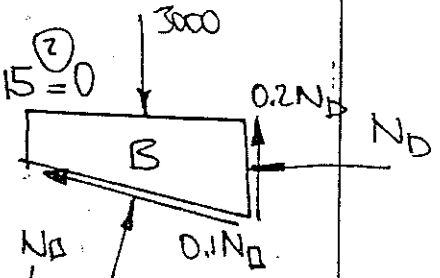
PROBLEM 8-67



Block B:

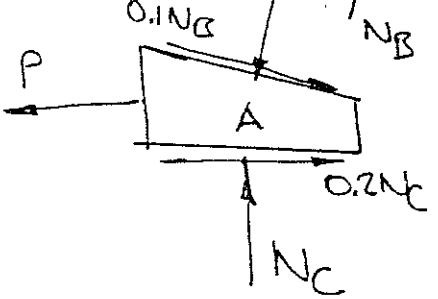
$\Sigma F_x = 0, \quad N_B \sin 15 - 0.1 N_B \cos 15 - N_D = 0 \quad (1)$

$\Sigma F_y = 0, \quad 3000 - 0.2 N_D - 0.1 N_B \sin 15 - N_B \cos 15 = 0 \quad (2)$



$(1), (2) \Rightarrow 3000 - N_B [0.03245 + 0.9918] = 0$

$N_B = \frac{3000}{1.024} \approx 2929^{lb}$



Block A:

$\Sigma F_y = 0, \quad N_B \cos 15 + 0.1 N_B \sin 15 = N_C \approx 2905^{lb}$

$\Sigma F_x = 0, \quad P = (0.1 N_B \cos 15) + 0.2 N_C - N_B \sin 15$

$P \approx 105.7^{lb}$

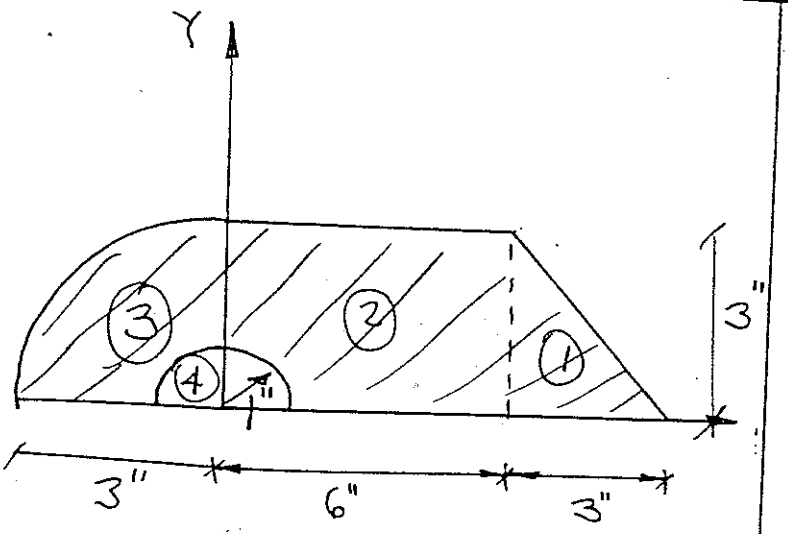
PROBLEM 9-56:

① = TRIANGLE IN

② = RECTANGLE IN

③ = $\frac{1}{4}$ CIRCLE IN

④ = $\frac{1}{4}$ CIRCLE OUT x2



ITEM	A_i	x_i	y_i	$A_i x_i$	$A_i y_i$
①	4.5	7	1	31.5	4.5
②	18	3	1.5	54	27
③	7.07	-1.27	+1.27	-8.98	+8.98
④	-0.785×2	0	+0.425	0	-033×2
TOTAL	28.00^{in^2}			76.52	39.82

$$\bar{x} = \frac{76.52}{28.00} = 2.73 = \bar{x}$$

$$\bar{y} = \frac{39.82}{28.00} = 1.42 = \bar{y}$$