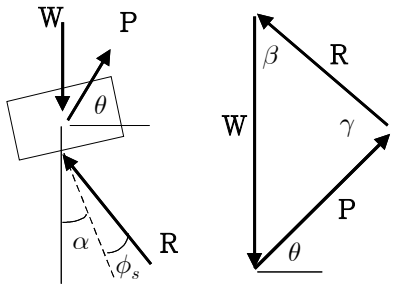
[8.3~8.4절]

8.9 $\mu_s = 0.30, \quad \mu_k = 0.25$

$\theta = 65°, \quad \alpha = 35°, \quad W = 500\ \text{N}$

$\phi_s = \tan^{-1}0.30 = 16.70°$

(a) 위로 움직이려 할 때



$\beta = \alpha + \phi_s = 35° + 16.70° = 51.70°$

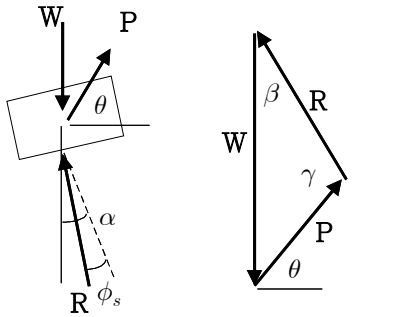
$\gamma = (90°-\beta) + \theta = (90°-51.70°) + 65° = 103.3°$

$$\frac{P}{\sin\beta} = \frac{W}{\sin\gamma}$$

$$P = W\,\frac{\sin\beta}{\sin\gamma}$$

$$= (500\ \text{N})\,\frac{\sin 51.70°}{\sin 103.3°} = 403.2\ \text{N} \quad \Rightarrow \quad P = 403\ \text{N}$$

(b) 아래로 움직이려 할 때



$\beta = \alpha - \phi_s = 35° - 16.70° = 18.30°$

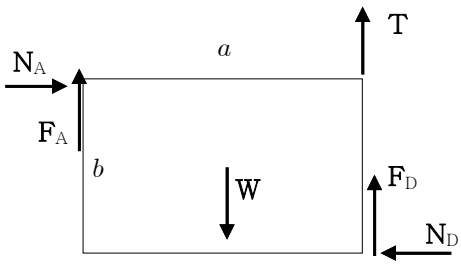
$\gamma = (90°-\beta) + \theta = (90°-18.30°) + 65° = 136.7°$

$$\frac{P}{\sin\beta} = \frac{W}{\sin\gamma}$$

$$P = W\,\frac{\sin\beta}{\sin\gamma}$$

$$= (500\ \text{N})\,\frac{\sin 18.30°}{\sin 136.7°} = 228.9\ \text{N} \quad \Rightarrow \quad P = 229\ \text{N}$$

8.25 $W = 10\ \text{N}, \quad T = 5\ \text{N}, \quad a = 36\ \text{cm}, \quad b = 27\ \text{cm}$



$\rightarrow \Sigma F_x = 0\ ; \quad N_A - N_D = 0$

$\Rightarrow \quad N_A = N_D$

최소 정지마찰계수 ⇒ 움직이려 함.

$F_A = \mu_s N_A, \quad F_D = \mu_s N_D$

$\uparrow \Sigma F_y = 0\ ; \quad F_A + F_D + T - W = 0$

$$\Rightarrow \quad 2\,\mu_s N_A + T - W = 0 \quad \Rightarrow \quad N_A = \frac{W-T}{2\,\mu_s}$$

$\circlearrowleft \Sigma M_D = 0\ ; \quad \frac{a}{2}W - a\,F_A - b\,N_A = 0$

$$\Rightarrow \quad \frac{a}{2}W - a\,\mu_s\,\frac{W-T}{2\,\mu_s} - b\,\frac{W-T}{2\,\mu_s} = 0$$

$$\Rightarrow \quad \mu_s\,(a\,T) = b\,(W-T)$$

$$\Rightarrow \quad \mu_s = \frac{b\,(W-T)}{a\,T} = \frac{(27\ \text{cm})\,[(10\ \text{N}) - (5\ \text{N})]}{(36\ \text{cm})\,(5\ \text{N})} = 0.750$$