

&lt;8.1~8.2절&gt;

$$8.2 \quad \theta = 30^\circ, \quad P = 30 \text{ N}, \quad W = 240 \text{ N}$$

$$\mu_s = 0.35, \quad \mu_k = 0.25$$

&lt;방법1&gt;

$$\nearrow \Sigma F_n = 0; \quad N - W \cos\theta - P \sin\theta = 0$$

$$\Rightarrow N = W \cos\theta + P \sin\theta$$

$$= (240 \text{ N}) \cos 30^\circ + (30 \text{ N}) \sin 30^\circ = 222.84 \text{ N}$$

$$F_{\max} = \mu_s N = (0.35) (222.84 \text{ N}) = 78.00 \text{ N}$$

$$\searrow \Sigma F_t = 0; \quad F + W \sin\theta - P \cos\theta = 0$$

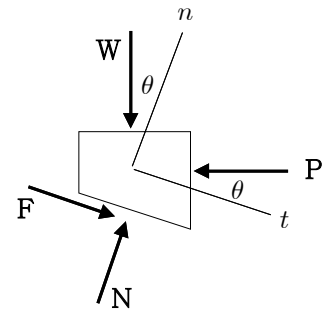
$$\Rightarrow F = -W \sin\theta + P \cos\theta$$

$$= -(240 \text{ N}) \sin 30^\circ + (30 \text{ N}) \cos 30^\circ = -94.019 \text{ N}$$

$|F| > F_{\max} \Rightarrow$  불가능  $\Rightarrow$  평형상태 아님.

$F < 0 \Rightarrow$  마찰력 방향 반대  $\Rightarrow$  미끄러져 내려감.

$$F = \mu_k N = (0.25) (222.84 \text{ N}) = 55.71 \text{ N} \quad \Rightarrow \quad \mathbf{F} = 55.7 \text{ N} \angle 30^\circ$$



&lt;방법2&gt;

$$\nearrow \Sigma F_n = 0; \quad N - W \cos\theta - P \sin\theta = 0$$

$$\Rightarrow N = W \cos\theta + P \sin\theta$$

$$= (240 \text{ N}) \cos 30^\circ + (30 \text{ N}) \sin 30^\circ = 222.84 \text{ N}$$

$$F_{\max} = \mu_s N = (0.35) (222.84 \text{ N}) = 78.00 \text{ N}$$

$$\searrow \Sigma F_t = 0; \quad -F + W \sin\theta - P \cos\theta = 0$$

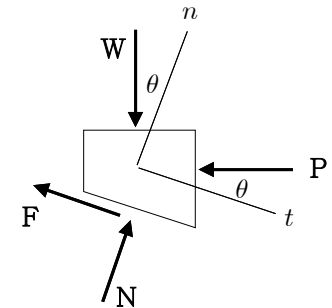
$$\Rightarrow F = W \sin\theta - P \cos\theta$$

$$= (240 \text{ N}) \sin 30^\circ - (30 \text{ N}) \cos 30^\circ = 94.019 \text{ N}$$

$|F| > F_{\max} \Rightarrow$  불가능  $\Rightarrow$  평형상태 아님.

$F > 0 \Rightarrow$  마찰력 방향 맞음  $\Rightarrow$  미끄러져 내려감.

$$F = \mu_k N = (0.25) (222.84 \text{ N}) = 55.71 \text{ N} \quad \Rightarrow \quad \mathbf{F} = 55.7 \text{ N} \angle 30^\circ$$



8.16  $W = 480 \text{ N}, \quad \mu_s = 0.30, \quad d = 0.6 \text{ m}$

(a)  $F_A = \mu_s N_A, \quad F_B = \mu_s N_B$

$$\uparrow \Sigma F_y = 0$$

$$N_A + N_B - W = 0$$

$$\Rightarrow N_A + N_B = W$$

$$\rightarrow \Sigma F_x = 0$$

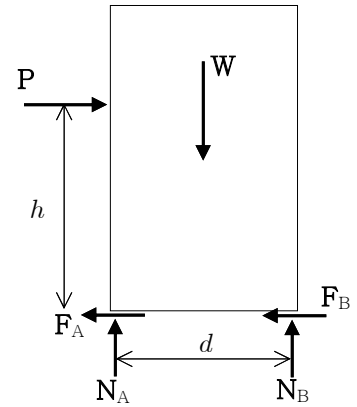
$$P - F_A - F_B = 0$$

$$\Rightarrow P = F_A + F_B = \mu_s N_A + \mu_s N_B$$

$$= \mu_s (N_A + N_B) = \mu_s W$$

$$= (0.30)(480 \text{ N}) = 144 \text{ N}$$

$$P = 144.0 \text{ N} \rightarrow$$



(b) 넘어지려는 순간  $N_A = 0, \quad F_A = 0$

$$\uparrow \Sigma M_B = 0$$

$$h P - \frac{d}{2} W = 0$$

$$\Rightarrow h = \frac{d}{2} \frac{W}{P} = \frac{0.6 \text{ m}}{2} \frac{480 \text{ N}}{144 \text{ N}} = 1 \text{ m}$$

$$h_{\max} = 1.000 \text{ m}$$

8.19  $\mu_s = 0.40, \quad \mu_k = 0.30, \quad P = 3000 \text{ N}$

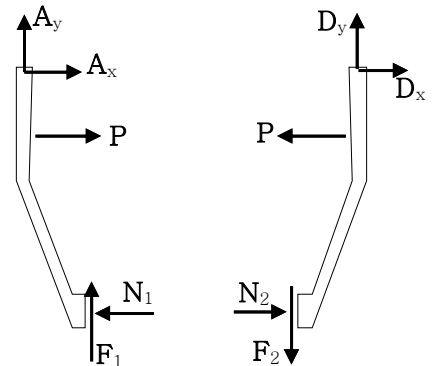
$$F_1 = \mu_k N_1, \quad F_2 = \mu_k N_2$$

AB에서  $\Sigma M_A = 0$  ;

$$(0.150 \text{ m}) P + (0.150 \text{ m}) \mu_k N_1 - (0.450 \text{ m}) N_1 = 0$$

$$\Rightarrow N_1 = P \frac{1}{3 - \mu_k} = (3000 \text{ N}) \frac{1}{3 - 0.30} = 1111.11 \text{ N}$$

$$\Rightarrow F_1 = (0.30)(1111.11 \text{ N}) = 333.33 \text{ N}$$



DE에서  $\Sigma M_D = 0$  ;

$$-(0.150 \text{ m}) P + (0.150 \text{ m}) \mu_k N_2 + (0.450 \text{ m}) N_2 = 0$$

$$\Rightarrow N_2 = P \frac{1}{3 + \mu_k} = (3000 \text{ N}) \frac{1}{3 + 0.30} = 909.09 \text{ N}$$

$$\Rightarrow F_2 = (0.30)(909.09 \text{ N}) = 272.727 \text{ N}$$

드럼에서  $\Sigma M_C = 0$  ;

$$(0.250 \text{ m}) (F_1 + F_2) - M = 0$$

$$\Rightarrow M = (0.250 \text{ m}) [(333.33 \text{ N}) + (272.73 \text{ N})] = 151.5 \text{ N}\cdot\text{m}$$

