

[8.3~8.4절]

8.9 $\mu_s = 0.25, \mu_k = 0.20, P = 30 \text{ N}$

$$\phi_s = \tan^{-1} \mu_k = \tan^{-1}(0.25) = 14.04^\circ$$

$$\beta = \theta - \phi_s$$

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

$$\Rightarrow \sin \beta = \frac{W}{P} \sin \phi_s$$

(a) $W = 75 \text{ N}$

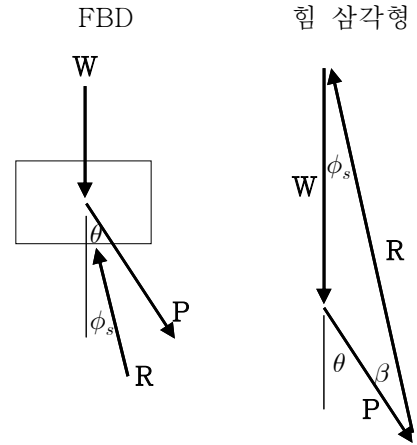
$$\sin \beta = \frac{75 \text{ N}}{30 \text{ N}} \sin(14.04^\circ) = 0.6064$$

$$\theta = \phi_s + \sin^{-1}(0.6064) = 14.04^\circ + 37.34^\circ = 51.38^\circ \Rightarrow \theta = 51.4^\circ$$

(b) $W = 100 \text{ N}$

$$\sin \beta = \frac{100 \text{ N}}{30 \text{ N}} \sin(14.04^\circ) = 0.8087$$

$$\theta = \phi_s + \sin^{-1}(0.8087) = 14.04^\circ + 53.97^\circ = 68.01^\circ \Rightarrow \theta = 68.0^\circ$$



8.21 $\mu_s = 0.40, \mu_k = 0.30, P = 3000 \text{ N}$

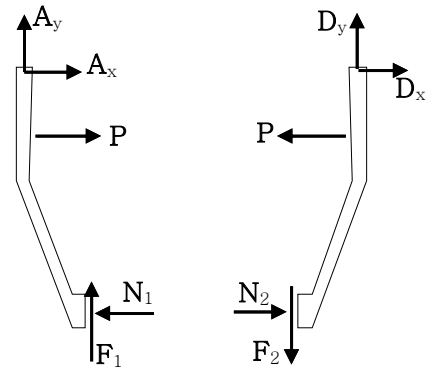
$$F_1 = \mu_k N_1, F_2 = \mu_k N_2$$

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 $\Sigma M_C = 0$;

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

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

