HW5-12 Soln)

Let up and to the right be the positive directions.

NII:

$$\text{x:}\quad +F\cos\theta - F_{fK} = ma_x = 0 \ \text{(constant velocity)}$$

$$\text{y:}\quad +F_N - gm + F\sin\theta = ma_y = 0$$

$$F_{fK} = \mu_K F_N$$

Then,

$$F\cos\theta = F_{fK} = \mu_K F_N = \mu_K(gm - F\sin\theta) = \mu_K gm - \mu_K F\sin\theta$$

$$F\cos\theta + \mu_K F\sin\theta = \mu_K gm$$

$$F\cos\theta + \mu_K F\sin\theta = \mu_K gm$$

$$F(\cos\theta + \mu_K\sin\theta) = \mu_K gm$$

$$F = \frac{\mu_K gm}{\cos\theta + \mu_K\sin\theta} = \frac{(0.7)10(60)}{\cos(37) + 0.7\sin(37)} = 344\ \text{N}$$