Exercise 8-18

This is very similar to Exercise 8-16, except that $a_x \neq 0$. The force diagram is identical to that of Exercise 8-16. Determine a_x from the given displacement & time:

$$x = x_0 + v_{0x}t + \tfrac{1}{2}a_x t^2$$

$$\therefore 11.5 = 0 + 0 + \tfrac{1}{2}a_x (2.50)^2$$

$$\therefore a_x = 3.68 \text{ m/s}^2$$

Then, as in Ex. 8-16:

$$\Sigma F_x = m a_x$$

$$mg\sin\theta - \mu_k mg\cos\theta = ma_x$$

$$\therefore \mu_k = \frac{g\sin\theta - a_x}{g\cos\theta}$$

$$= \frac{9.80\sin 29.0^\circ - 3.68}{9.80\cos 29.0^\circ}$$

$$= 0.125$$