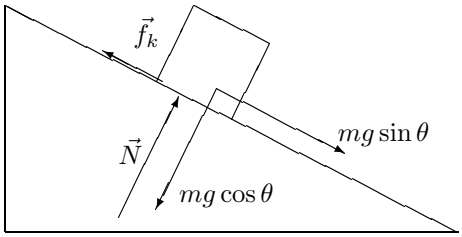
14. We first analyze the forces on the pig of mass m. The incline angle is θ.

The $+x$ direction is "downhill."



Application of Newton's second law to the x and y axes leads to

$$\begin{aligned} mg\sin\theta - f_k &= ma \\ N - mg\cos\theta &= 0\ . \end{aligned}$$

Solving these along with Eq. 6-2 ($f_k = \mu_k N$) produces the following result for the pig's downhill acceleration:

$$a = g\left(\sin\theta - \mu_k\cos\theta\right)\ .$$

To compute the time to slide from rest through a downhill distance ℓ, we use Eq. 2-15:

$$\ell = v_0 t + \frac{1}{2}at^2 \quad\Longrightarrow\quad t = \sqrt{\frac{2\ell}{a}}\ .$$

We denote the frictionless ($\mu_k = 0$) case with a prime and set up a ratio:

$$\frac{t}{t'} = \frac{\sqrt{2\ell/a}}{\sqrt{2\ell/a'}} = \sqrt{\frac{a'}{a}}$$

which leads us to conclude that if $t/t' = 2$ then $a' = 4a$. Putting in what we found out above about the accelerations, we have

$$g\sin\theta = 4g\left(\sin\theta - \mu_k\cos\theta\right)\ .$$

Using $\theta = 35°$, we obtain $\mu_k = 0.53$.