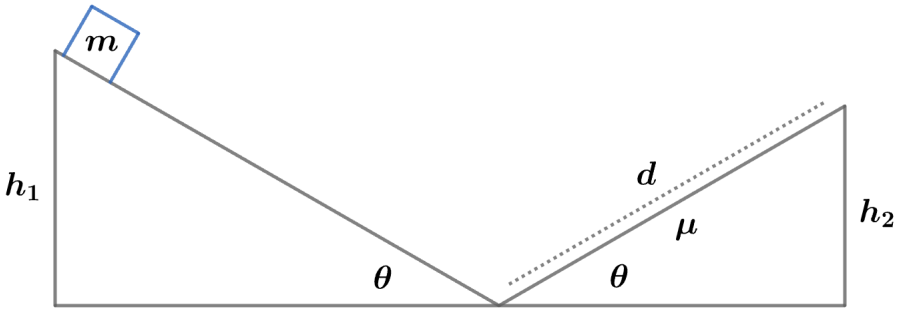
2014 F=ma Exam: Problem 25

Kevin S. Huang



Between the start and end, the gravitational potential energy of the block is dissipated by friction. We have

$$\Delta U_g = mg(h_1 - h_2) = E_{\text{dis}} = fd = \mu mg \cos\theta \left(\frac{h_2}{\sin\theta}\right)$$

Solving for h_2,

$$(h_1 - h_2)\sin\theta = h_2 \mu \cos\theta$$
$$h_1 \sin\theta = h_2 \sin\theta + h_2 \mu \cos\theta$$
$$h_2 = \frac{h_1 \sin\theta}{\sin\theta + \mu\cos\theta}$$

so the answer is $\boxed{\text{A}}$.