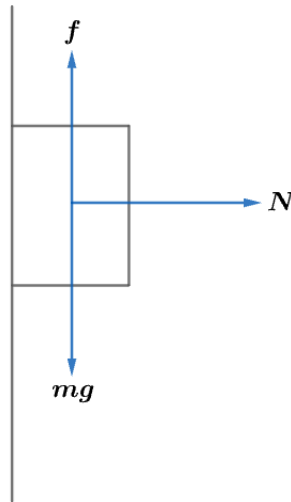


## 2008 F=ma Exam: Problem 8

Kevin S. Huang



The normal force provides the centripetal acceleration so we have

$$N = m\omega^2 R = \frac{m\omega^2 d}{2}$$

The friction force must balance gravity and is bounded by the threshold for static friction,

$$f = mg \leq \mu N$$

Substituting in the normal force,

$$mg \leq \frac{\mu m\omega^2 d}{2}$$
$$\mu \geq \frac{2g}{\omega^2 d} = \frac{2(10 \text{ m/s}^2)}{\left(45 \frac{\text{rev}}{\text{min}} \cdot \frac{1}{60} \frac{\text{min}}{\text{s}} \cdot 2\pi \frac{\text{rad}}{\text{rev}}\right)^2 (8.0 \text{ m})} = 0.11$$

so the answer is  C.