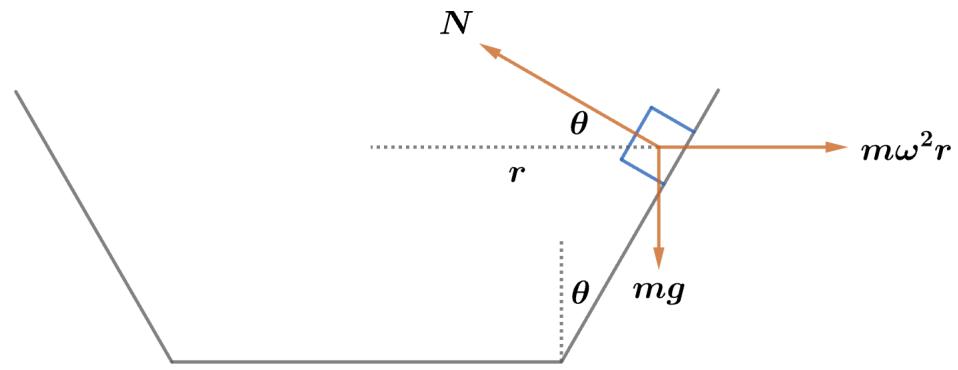


2024 F=ma Exam: Problem 2

Kevin S. Huang



We go to the rotating frame and add the (fictitious) centrifugal force $m\omega^2r$ directed outward. When the rider's feet lift off the floor, we only have the rider's weight and the normal force from the wall. Balancing forces,

$$N \cos \theta = m\omega^2 r$$

$$N \sin \theta = mg$$

Dividing the equations,

$$\cot \theta = \frac{\omega^2 r}{g}$$

$$\omega = \sqrt{\frac{g \cot \theta}{r}} = \sqrt{\frac{(10 \text{ m/s}^2) \cot(\pi/6)}{5 \text{ m}}} = 1.9 \text{ s}^{-1}$$

so the answer is A.