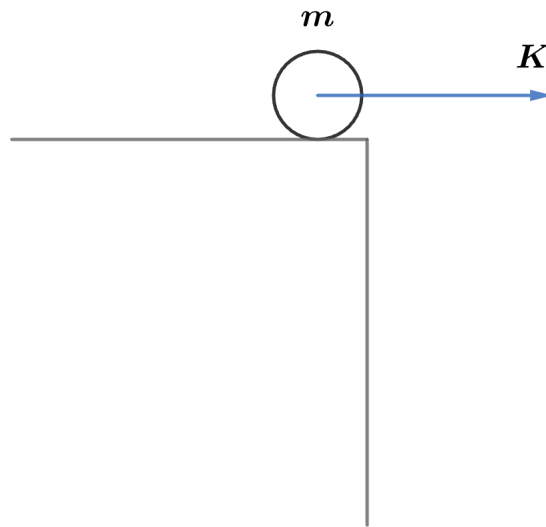


2010 F=ma Exam: Problem 12

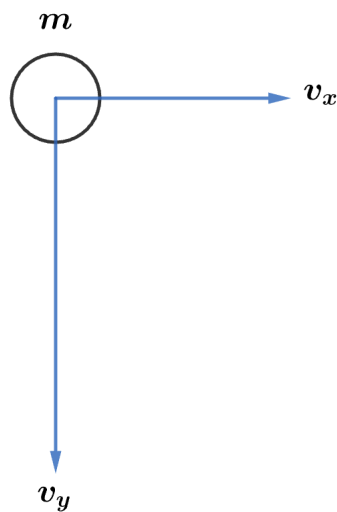
Kevin S. Huang



By definition of kinetic energy,

$$K = \frac{1}{2}mv_x^2$$

where v_x is the initial horizontal velocity of the ball.



Since the ball is undergoing projectile motion, its horizontal velocity stays constant. After time t , its vertical velocity is

$$v_y = gt$$

We are given the kinetic energy at this point is $3K$ so we have

$$3K = \frac{1}{2}mv^2 = \frac{1}{2}mv_x^2 + \frac{1}{2}mv_y^2 = K + \frac{1}{2}m(gt)^2$$

$$4K = mg^2t^2$$

$$t = \frac{2}{g}\sqrt{\frac{K}{m}}$$

so the answer is B.