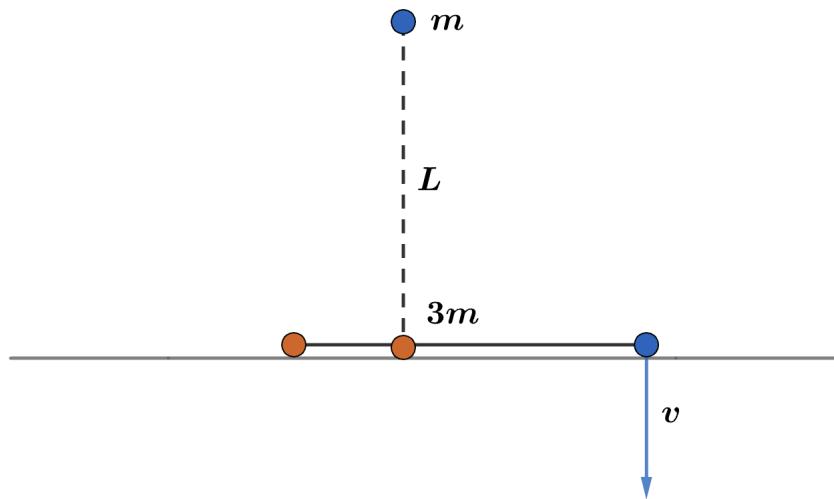


## 2016 F=ma Exam: Problem 22

Kevin S. Huang



Just before the top ball hits the ground, it is moving directly downward. This is because if it had a velocity component parallel to the rod, then the bottom ball would also have the same parallel component to keep the rod length fixed. But the system would then violate conservation of momentum.



Thus, the bottom ball is at rest in the end and the top ball has all the kinetic energy. Conserving energy from the beginning,

$$mgL = \frac{1}{2}mv^2$$

$$v = \sqrt{2gL}$$

so the answer is A.