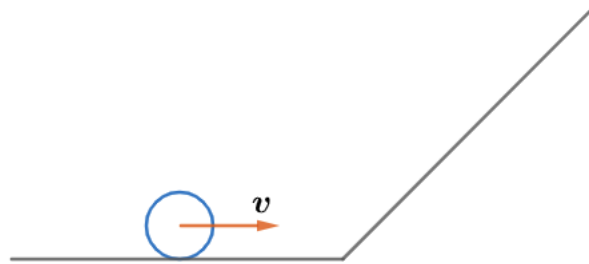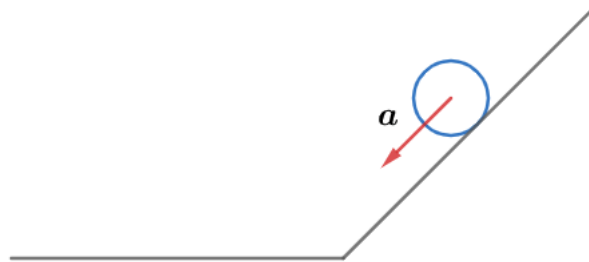# 2021 F=ma Exam: Problem 1

Kevin S. Huang

In the beginning, the ball moves with constant velocity:

Since the ball is always rolling without slipping, recall it has constant acceleration (given by $a = \frac{g \sin \theta}{1+\beta}$ where the ball's moment of inertia $I = \beta m r^2$) on the incline,

so the speed decreases to zero then increases again. At the end, the ball moves with constant velocity in the opposite direction since energy is conserved:
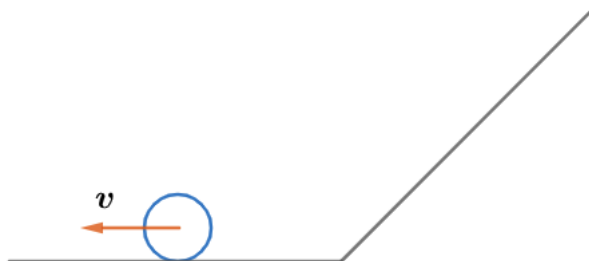
Thus, the speed of the ball over time is shown in graph $\boxed{\text{C}}$.