79. We note that its mass is $M = 36/9.8 = 3.67$ kg and its rotational inertia is $I_{\text{com}} = \frac{2}{5}MR^2$ (Table 11-2(f)).

(a) Using Eq. 12-2, Eq. 12-5 becomes

$$\begin{aligned} K &= \frac{1}{2}I_{\text{com}}\omega^2 + \frac{1}{2}Mv_{\text{com}}^2 \\ &= \frac{1}{2}\left(\frac{2}{5}MR^2\right)\left(\frac{v_{\text{com}}}{R}\right)^2 + \frac{1}{2}Mv_{\text{com}}^2 \\ &= \frac{7}{10}Mv_{\text{com}}^2 \end{aligned}$$

which yields $K = 61.7$ J for $v_{\text{com}} = 4.9$ m/s.

(b) This kinetic energy turns into potential energy Mgh at some height $h = d\sin\theta$ where the sphere comes to rest. Therefore, we find the distance traveled up the $\theta = 30°$ incline from energy conservation:

$$\frac{7}{10}Mv_{\text{com}}^2 = Mgd\sin\theta \implies d = \frac{7v_{\text{com}}^2}{10g\sin\theta} = 3.43 \text{ m} .$$

(c) As shown in the previous part, M cancels in the calculation for d. Since the answer is independent of mass, then, it is also independent of the sphere's weight.