A circular disk with mass $m$ and radius $R$ is mounted at its center, about which it can rotate freely. A light cord wrapped around it supports $mg$.

Find the total kinetic energy of the system, when the mass $m$ is falling with the speed $v$.

A) $K = \frac{1}{2} m v^2$

B) $K = \frac{3}{4} m v^2$.

C) $K = m v^2$

D) $K = \frac{5}{4} m v^2$. 
Based on conservation of energy, express $v$ in terms of the falling distance $h$.

$$K = K_{\text{trans}} + K_{\text{rot}} = \frac{1}{2} m v^2 + \frac{1}{4} m R^2 \omega^2 = \frac{3}{4} m v^2.$$ 

Answer B.

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