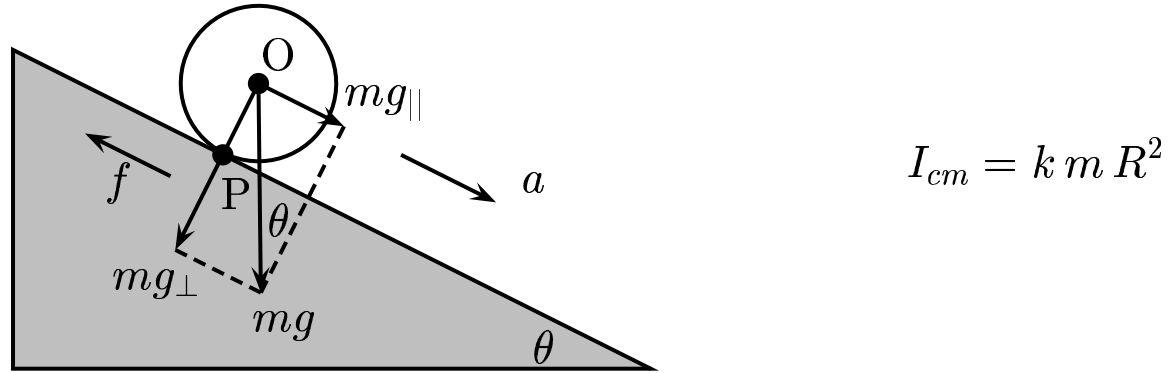


Consider a ball of mass m with its moment of inertia $I_{cm} = I_O = k m R^2$ rolling down an incline. The angle between the incline and the horizontal direction is θ .



The equation of motion along the incline, “ $\tau = I \alpha$ ”, is given by

- A) $\tau = m g_{\parallel} R = k m R^2 \alpha .$
- B) $\tau = m g_{\parallel} R = (1 + k) m R^2 \alpha .$
- C) $\tau = m g R = k m R^2 \alpha .$
- D) $\tau = m g R = (1 + k) m R^2 \alpha .$

By inspection, the torque about P is $\tau = m g_{\parallel} R$, and the moment of inertia of the ball about P is $(1 + k) m R^2$.

So equation of motion now reads

$$\tau = m g_{\parallel} R = I_P \alpha = (1 + k) m R^2 \alpha = (1 + k) m R a .$$

This gives $a = \frac{g \sin \theta}{1 + k}$.

Answer **B**.