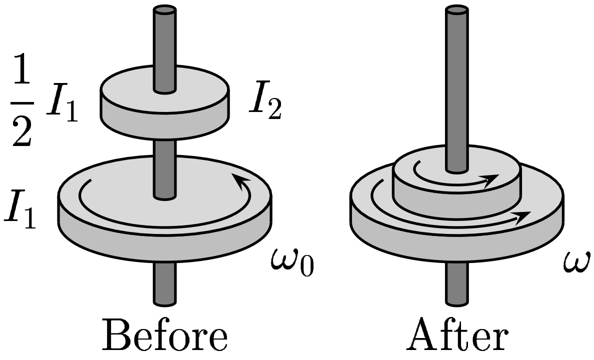

Consider the arrangement shown in the figure. Initially the disk 1 is rotating with an angular velocity ω_0 and disk 2 is at rest.

Then the disk 2 is dropped so that the disks are now rotating together with some reduced angular velocity ω.

$$\textit{Given}\ \ I_2 = \frac{I_1}{2}. \quad \textit{Find}\ \ \frac{\omega}{\omega_0}.$$

A) $\frac{\omega}{\omega_0} = 1$.

B) $\frac{\omega}{\omega_0} = \frac{2}{3}$.

C) $\frac{\omega}{\omega_0} = \frac{1}{2}$.

D) $\frac{\omega}{\omega_0} = \frac{3}{4}$.

E) $\frac{\omega}{\omega_0} = \frac{1}{3}$.

The angular momentum is conserved; *i.e.*,

$$L_{before} = L_{after}.$$

This leads to $I_1\,\omega_0 = (\,I_1 + I_2\,)\,\omega$, so $\omega = \frac{I_1}{I_1 + I_2}\,\omega_0$.

With $I_2 = \frac{I_1}{2}$, so $\frac{\omega}{\omega_0} = \frac{2}{3}$.

Answer **B**.