

Another Torque Problem

A massless string is attached to a disk of uniform mass density μ and radius R at the top of the disk. A weight of mass m is attached to the bottom of the string. When released, the disk has an angular acceleration of α . Find, in the following three situations, what m is in terms of α , μ , R , and g .

1. The disk has no holes.
2. The disk has a concentric circular hole of radius $\frac{R}{2}$.
3. The disk has four circular holes, each of radius $\frac{R}{4}$. The centers of the holes are all at a distance of $\frac{R}{2}$ from the center of the disk.