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 $m g$.

Find equations of motion. Note: $a = R \alpha$.

A) $TR = MR^2 \alpha$ and $mg - T = ma$.

B) $TR = MR^2 \alpha$ and $T - mg = ma$.

C) $TR = \frac{MR^2 \alpha}{2}$ and $mg - T = ma$.

D) $TR = \frac{MR^2 \alpha}{2}$ and $T - mg = ma$. 
Remember for a disk, $I = \frac{M R^2}{2}$.

Equations of motion are: $\tau = T R = I \alpha$ and $F = m g - T = ma$.

Answer C.

10.07-01 'A' Disk and a Mass 2007-3-27