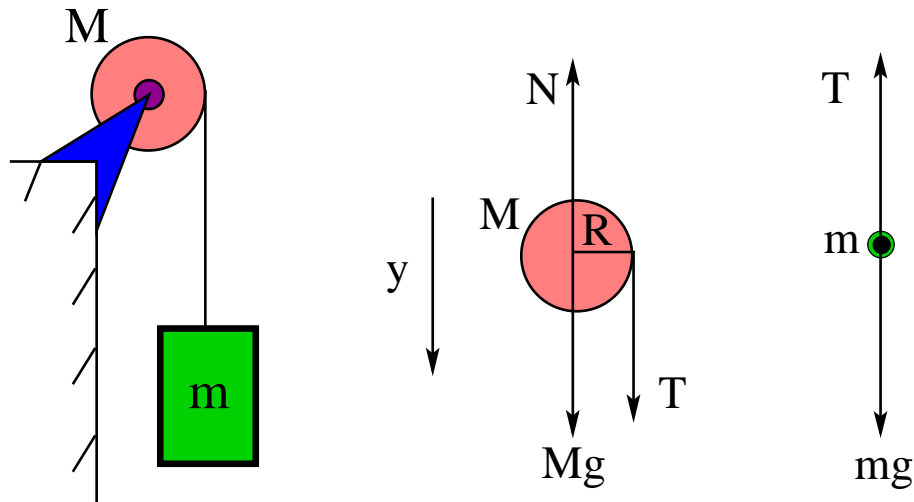


Ex : A uniform disk of mass $M = 2.5 \text{ kg}$ is mounted on a fixed axis. A block of mass $m = 1.2 \text{ kg}$ hangs from a massless cord that is wrapped around the rim of the disk. What is the acceleration of the falling block?



o From Newton's 2nd Law for translations: $mg - T = ma$

o Now apply Newton's Second Law for rotations:

$$\tau = RT \sin 90^\circ = RT = I\alpha$$

$$RT = \left(\frac{1}{2}MR^2\right) \alpha \quad \Rightarrow \quad T = \frac{1}{2}MR\alpha = \frac{1}{2}Ma$$

$$\text{So,} \quad mg - T = mg - \frac{1}{2}Ma = ma$$

$$a = g \frac{2m}{M + 2m} = 9.8 \text{ m/s}^2 \left(\frac{2 \cdot 1.2 \text{ kg}}{2.5 \text{ kg} + 2 \cdot 1.2 \text{ kg}} \right) = 4.8 \text{ m/s}^2$$