Static Equilibrium Analysis

\[ \tau_{net} = \sum \tau_i = 0 \]

What is the unknown mass?

BALANCEING in mass \times distance

Force \times distance

\textbf{What is the unknown mass?}

A metal advertising sign (mass \( M \)) is suspended from the end of a horizontal rod of length \( L \) and mass \( m \).

Applications of Newton’s Laws for Rotation

\begin{align*}
\text{Equilibrium Analysis} & \quad \vec{F}_{net} = 0 \\
& \quad \vec{\tau}_{net} = 0 \\
\text{Non-Equilibrium Analysis} & \quad \vec{F}_{net} = m\vec{a} \\
& \quad \vec{\tau}_{net} = I\vec{\alpha}
\end{align*}

Static Equilibrium

No Translational and Rotational Motions

Equilibrium Analysis
\[ \vec{F}_{\text{net}} = 0 \]
\[ \tau_{\text{net}} = 0 \]

Try this!

Another Example

\[ M, m, l, \theta, \mu_s: \text{given} \]
\[ \Rightarrow F_w?, x? \]