SiQuENC: Static equilibrium (if doing τ before N2L for rotation)

Neatly and graphically represent situation(s)

1. Draw large figure of extended mass distribution and environment.
2. Indicate quantities to be found.

Graphically represent quantities and their relationships

3. Use **BETA** to draw free-body diagram, positioning the tail of each force vector at the position at which the force acts (do NOT simplify the entire extended mass distribution as a "dot").
4. When setting up the axis system, indicate the **axis of rotation** (A.O.R.).

Identify relevant allowed starting point (in)equation(s)

5. Write **conditions for static equilibrium**

$$\text{Rotational equilibrium} \Rightarrow \sum_{\text{CCW}} \lvert\tau\rvert = \sum_{\text{CW}} \lvert\tau\rvert$$	$$\underbrace{a_x}_{0} = \frac{\overbrace{\sum F_x}^{0}}{m}$$	$$\underbrace{a_y}_{0} = \frac{\overbrace{\sum F_y}^{0}}{m}$$

Use numbered steps to show REASoNing

6. Populate left- and right-hand sides of the torque-sums-balance equation with **sums over** appropriate **magnitudes of torques**.
7. For each torque, **substitute** an expression using either of the following methods:

To fill in $$\lvert\tau_{\text{F}}\rvert := (r\sin\theta)F$$	To fill in $$\lvert\tau_{\text{F}}\rvert := r_{\perp}F$$
(a) Draw a **displacement** vector from the A.O.R. to the position from which the force acts. The length of this vector is r. (b) Draw an extended ray from the displacement vector. The **angle** between this extended ray and the force vector measures θ.	(a) Draw an infinite **line** containing the force vector ("line of action" of the force). (b) Identify the point on the line of action **closest** to the A.O.R. The distance between this point and the A.O.R. is $r_{\perp}$.

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