Ex: A safe of mass $M=430 \text{ kg}$ hangs from a uniform boom of mass $m=85 \text{ kg}$ whose dimensions are $a=1.9 \text{ m}$ and $b=2.4 \text{ m}$. Assume the support cable has negligible mass. Find the forces acting on the boom.

- Begin by drawing a free-body diagram of our system.
- Find the weight forces: 
  
  $W_b = mg = 834 \text{ N}$
  $W_M = Mg = 4218 \text{ N}$

- Begin with balance of torques; Use $O$ as the rotation point.

  $$\Sigma \tau_z = F_h(0) + F_y(0) - mg(b/2) - Mg(b) + Ta = 0$$

  so, 
  $$T = \frac{gb(M + m/2)}{a} = 5855 \text{ N}$$

- Now use balance of force equations to find $F_h$ and $F_v$.

  $$\Sigma F_x = F_h - T = 0, \quad F_h = 5855 \text{ N}$$
  $$\Sigma F_y = F_v - mg - Mg = 0 \quad F_v = 5050 \text{ N}$$