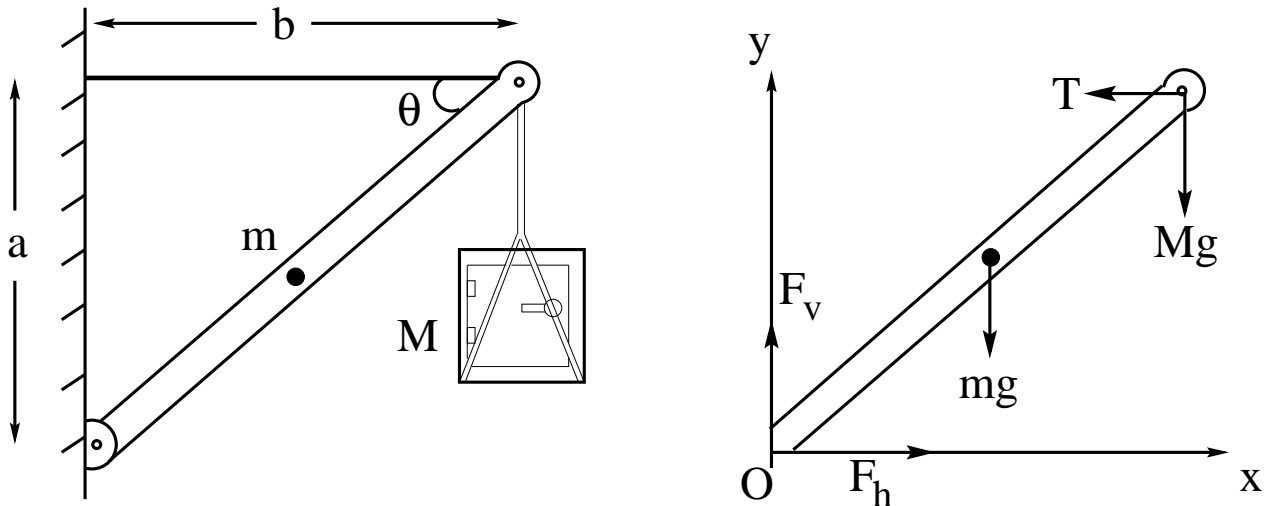


Ex : A safe of mass $M=430$ kg hangs from a uniform boom of mass $m=85$ kg whose dimensions are $a=1.9$ m and $b=2.4$ m. Assume the support cable has negligible mass. Find the forces acting on the boom.



o Begin by drawing a free-body diagram of our system.

- Find the weight forces : $W_b = mg = 834$ N
 $W_M = Mg = 4218$ N

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

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

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

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

$$\Sigma F_x = F_h - T = 0, \quad F_h = 5855 \text{ N}$$

$$\Sigma F_y = F_v - mg - Mg = 0 \quad F_v = 5050 \text{ N}$$