

48. (a) Computing the torques about the hinge, we have

$$TL \sin 40^\circ = W \frac{L}{2} \sin 50^\circ$$

where the length of the beam is  $L = 12$  m and the tension is  $T = 400$  N. Therefore, the weight is  $W = 671$  N.

- (b) Equilibrium of horizontal and vertical forces yields, respectively,

$$\begin{aligned} F_{\text{hinge } x} &= T = 400 \text{ N} \\ F_{\text{hinge } y} &= W \approx 670 \text{ N} \end{aligned}$$

where the hinge force components are rightward (for  $x$ ) and upward (for  $y$ ).