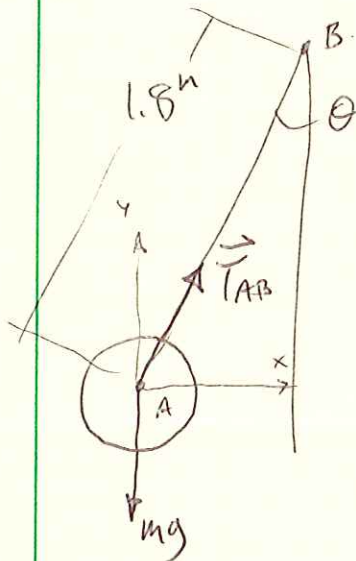


PROB. 12-37



$$m = 450^g = 0.45 \text{ kg}, \quad v = 4 \frac{\text{m}}{\text{s}}$$

FIND θ , T_{AB}

$$\vec{T}_{AB} = (T_{AB} \sin \theta) \hat{i} + (T_{AB} \cos \theta) \hat{j}$$

$$\sum F_y = ma_y \Rightarrow T_{AB} \cos \theta - mg = 0$$

$$\sum F_n = m \frac{v^2}{r} : T_{AB} \sin \theta = \frac{mv^2}{r}$$

$$T_{AB} = \frac{mg}{\cos \theta}$$

$$\left(\frac{mg}{\cos \theta} \right) \sin \theta = \frac{mv^2}{r}$$

$$\frac{\sin \theta}{\cos \theta} = \frac{v^2}{rg}$$

$$\sin \theta = \frac{r}{\text{HYP.}} , \quad r = \text{HYP.} \cdot \sin \theta$$

$$\frac{\sin \theta}{\cos \theta} = \frac{v^2}{\text{HYP.} \cdot g \cdot \sin \theta}$$

$$\frac{\sin^2 \theta}{\cos \theta} = \frac{v^2}{\text{HYP.} \cdot g} = \frac{\left(4 \frac{\text{m}}{\text{s}}\right)^2}{(1.8 \text{ m}) \left(9.81 \frac{\text{m}}{\text{s}^2}\right)} = 0.9061$$

SOLVE ITERATIVELY: $\theta = 49.85^\circ$

$$T_{AB} = \frac{mg}{\cos \theta} = \frac{(0.45 \text{ kg})(9.81 \frac{\text{m}}{\text{s}^2})}{\cos(49.85^\circ)} = 6.846 \text{ N}$$