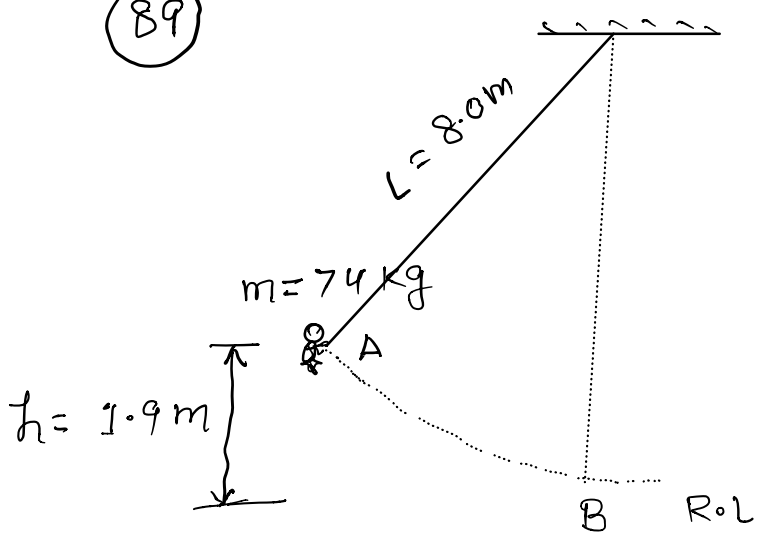
89



$W_{Non} = 0$

$T.E_A = T.E_B$

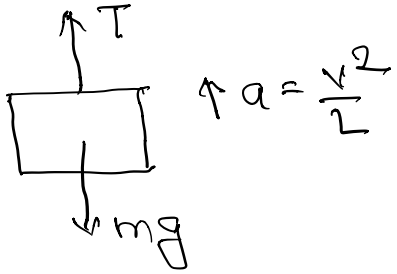
$P.E_A + K.E_A = P.E_B + K.E_B$

$mgh + 0 = 0 + \frac{1}{2}mv^2$

$mv^2 = 2mgh$ —— ①

$v = \sqrt{2gh}$

ⓐ F.B.D of Tarzen at lowest point



$$T - mg = \frac{mv^2}{L}$$

$$T = mg + \frac{mv^2}{L}$$

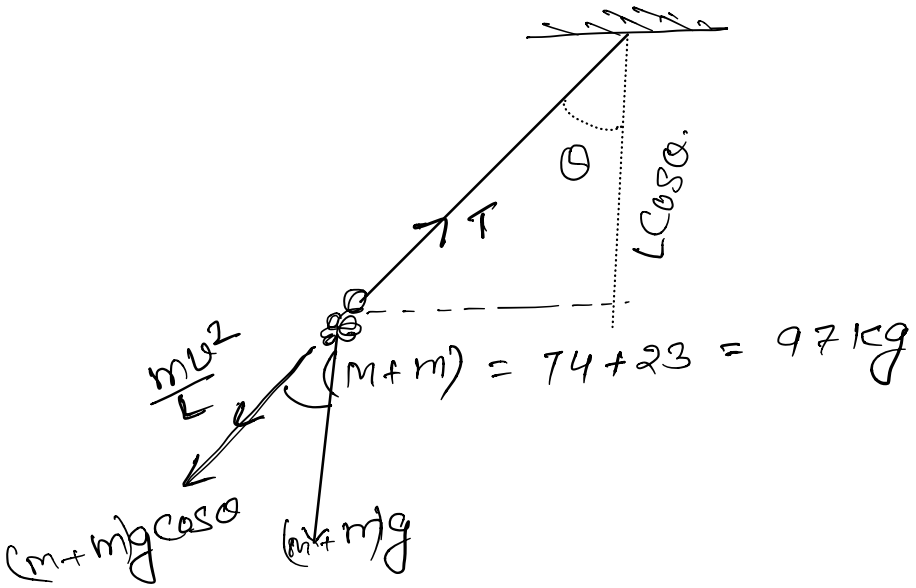
$$= 74 \times 9.8 + \frac{2mgh}{L}$$

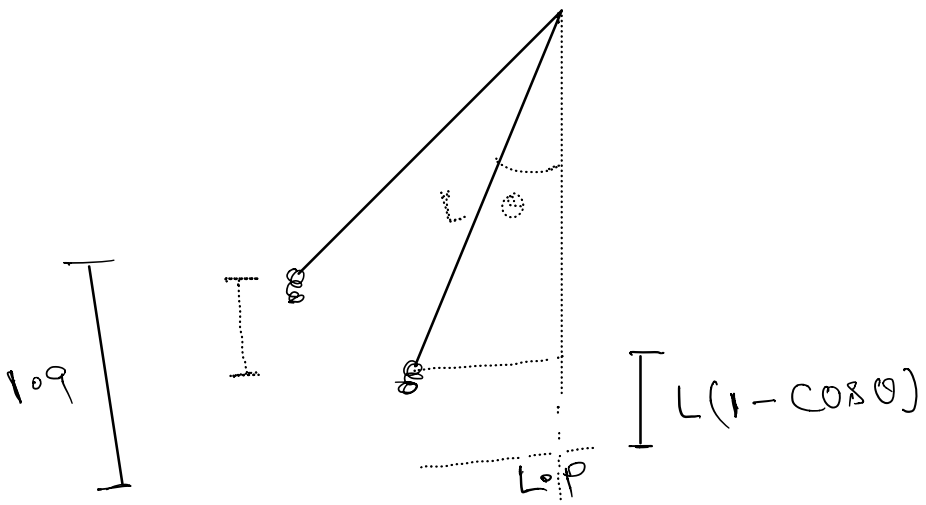
$$= 74 \times 9.8 + \frac{2 \times 74 \times 9.8 \times 1.9}{8}$$

$$= 725.2 + 344.47$$

$$\boxed{T = 1069.67 \text{ N}}$$

(b) Ans YES, vine will break.





$$(m+m)g\left[1.9 - L(1-\cos\theta)\right] = \frac{1}{2}(m+m)v^2$$

$$(m+m)v^2 = 2(m+m)g\left[1.9 - L(1-\cos\theta)\right]$$

$$T = (m+m)g\cos\theta + \frac{(m+m)v^2}{L}$$

$$1200 = (m+m)g\cos\theta + 2(m+m)g\,\frac{\left[1.9 - L(1-\cos\theta)\right]}{L}$$

$$1200 = 97 \times 9.8\cos\theta + 2 \times 97 \times 9.8\left[1.9 - L(1-\cos\theta)\right]$$

$$1200 = 950.6\cos\theta + 1901\left[1.9 - 8 + 8\cos\theta\right]$$

$$= 950.6\cos\theta - 11596 + 15208\cos\theta$$

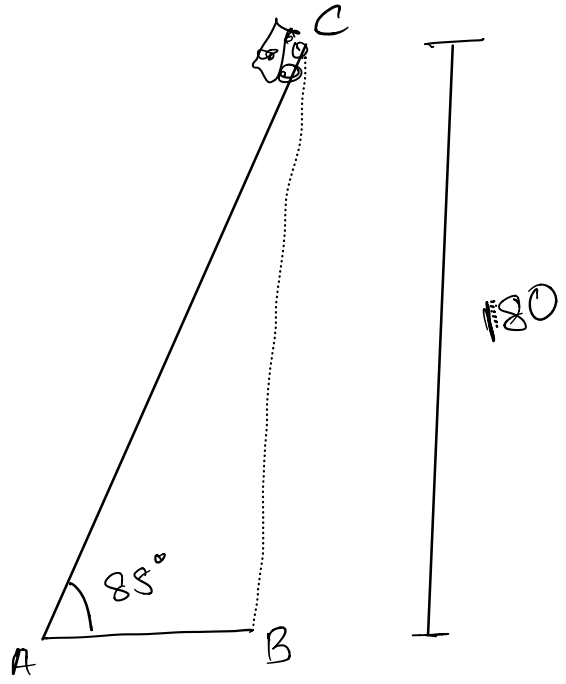
$$12796 = 16158.6\cos\theta$$

$$\cos\theta = 0.79$$

$$\theta = \cos^{-1}(0.79)$$

$$\boxed{\theta = 37.8^\circ}$$

(2) Any



length of track =

$$\sin 85^\circ = \frac{BC}{AC}$$

$$AC = \frac{BC}{\sin 85^\circ}$$

$$= \frac{180}{\sin 85^\circ}$$

$$\boxed{AC = 180.68 \text{ feet}}$$

=

from work Energy theorem

$$W_{NC} = \Delta U + \Delta K$$

$$\mu N \cdot S = \Delta U + \Delta K$$

$$-\mu \times mg\cos 0 \times 54.86 = -mgh + \frac{1}{2}mv^2$$

$$-\mu \cdot 9.8 \times \cos 85^\circ \times 55.07 = -9.8 \times 54.8 + \frac{(32.18)^2}{2}$$

$$47.03\,ll = -537.6 + 517.7$$

$$ll = \frac{19.9}{47.03} = 0.423$$