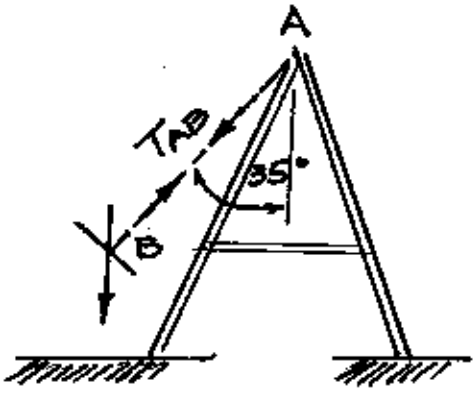
MECH 236

PROB. 12.44



$m_B = 22\,kg \quad \therefore W_B = (22kg)(9.81\frac{m}{s^2})$

$= 215.82\,N.$

$= 48.52\,lbf.$

$m_{swing} \approx 0$

a) T_{AB} when STATIC

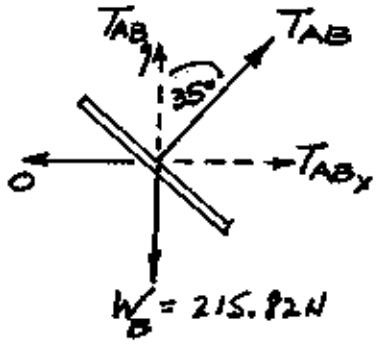
b) T_{AB} when DYNAMIC

(SWING IS HELD BY 2 ROPES.)

PLAYGROUND PROBLEM

F. MILANO

a.) SWING AT REST, $\Sigma\vec{F} = 0$



$\Sigma F_Y = 0 = +T_{BA_Y} - W_B$

$T_{BA}\cos 35° = 215.82\,N$

$T_{BA} = 263.47\,N \div 2$ ROPES

$\boxed{T_{BA} = 131.73\,N.}$

SELECT A ROPE THAT CAN WITHSTAND 132 N. PULLING FORCE FOR THIS CHILD = 48.5 lbf

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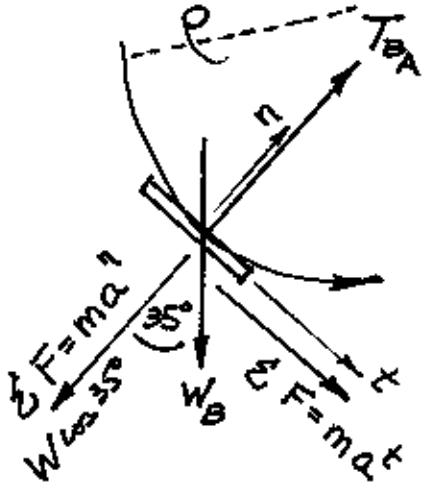
b.) SWING IN MOTION, $\Sigma\vec{F} = m\vec{a}$



ρ = RADIUS OF CURVATURE

$V = \omega\rho = \vec{\omega} \times \vec{\rho}$

$A_n = \vec{\omega} \times (\vec{\omega} \times \vec{\rho}) = \vec{\omega} \times \vec{V}$

$= \omega^2\rho = \left(\frac{V}{\rho}\right)^2\rho = \frac{V^2}{\rho}$

@ $t = 0$, $V = 0 \quad \therefore A_n = 0$

$\Sigma\vec{F}_n = m\vec{a}_n^{\,0}$

$(T_{BA} - W\cos 35°) = 0$

$\therefore T_{BA} = W\cos 35°$

$= 215.82^N \cos 35°$

$T_{BA} = 176.79^N \div 2$ ROPES

$\boxed{T_{BA} = 88.4\,N.}$ LESS TENSION IN MOTION

$\Sigma\vec{F}_t = ma^t$

$W\sin 35° = ma^t$

$\frac{215.82^N \sin 35°}{22\,kg.} = a^t$

$\boxed{a^t = 5.63\,\frac{m}{sec^2}}$

FIND a^t