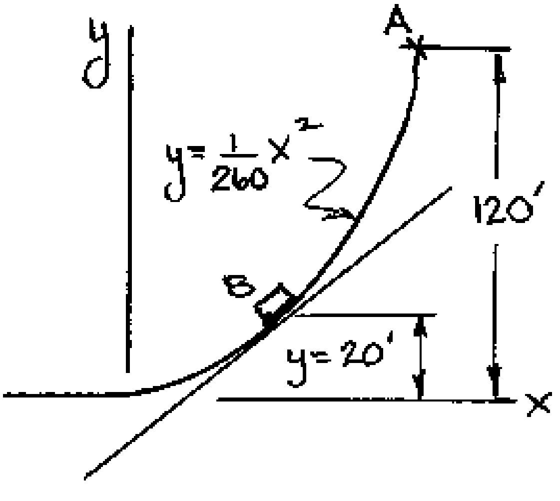
HIBBELER

14-90



GONDOLA RIDE BEGINS AT pt. A

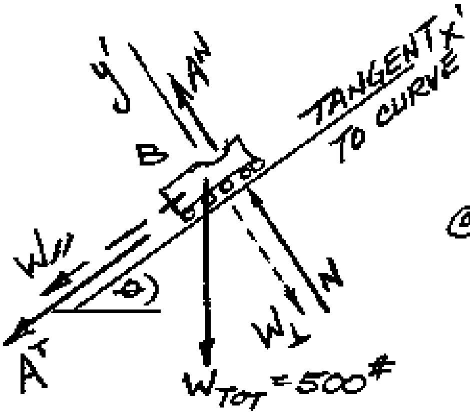
$t_A = 0 \quad \dot{x}_A = \dot{y}_A = 0$ AT REST

@ $y = \frac{1}{260} x^2$

when $y_A = 120' = \frac{1}{260} x^2$

$x_A = \sqrt{(120)(260)} = 176.64'$

when $y_B = 20'$, $x_B = \sqrt{(20)(260)} = 72.11'$



$\text{SLOPE} = \frac{\Delta Y}{\Delta X} = \frac{dy}{dx} = \frac{d}{dx}\left(\frac{1}{260} x^2\right) = \frac{x}{130}$

$\text{SLOPE} = \frac{1}{130} x = \frac{\Delta Y}{\Delta X} = \tan\theta$

@ $y_B = 20'$, $x_B = 72.11'$

$\therefore \tan\theta = 0.555 \quad \therefore \theta = 29.017°$

$\Sigma F_{y'} = m a^N$ @ pt. B

$$N - W_\perp = \frac{500^\#}{32.2 \frac{1}{s^2}} \left[\frac{V^2}{\rho}\right] \quad (1)$$

? MATH HANDBOOK!

ENERGY METHOD

$PE_A + KE_A = PE_B + PE_B$

$\Delta PE_{A-B} = mgh\Big]_{20}^{120} = (500^\#)(100')$

$\Delta KE_{A-B} = \frac{1}{2} m V^2 \Big]_0^V = \frac{1}{2} \frac{500^\#}{32.2 \,1/s^2} V^2$

$\Delta PE = \Delta KE \quad (2)$

$$V = \sqrt{\frac{(\cancel{500})(100)(2)(32.2)}{\cancel{500}}} = \boxed{80.25 \tfrac{1}{s} = V_B}$$

for (1) RADIUS of CURVATURE $\rho = \frac{\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}}{d^2y/dx^2}$

need $\frac{d^2}{dx^2} y = \frac{d}{dx}\left(\frac{x}{130}\right) = \frac{1}{130} \therefore$

SEE NEXT SHEET

RADIUS of CURVATURE

$$\rho = \frac{\left[1 + \left(\frac{x}{130}\right)^2\right]^{3/2}}{1/130} \qquad \text{@ pt. } B, \quad x = 72.11'$$

$$= 130\left[1 + \left(\frac{72.11}{130}\right)^2\right]^{3/2} = \boxed{194.4' = \rho} \quad \text{SUB. (1)}$$

$$(1) \qquad N - W\cos\theta = m\left[\frac{V^2}{\rho}\right]$$

$$N = \frac{500^{\#}}{32.2\,{}^{1}/_{s^2}}\left[\frac{(80.25\,{}^{1}/_{s})^2}{194.4'}\right] + 500^{\#}\cos 29.017^\circ$$

$$\boxed{N = 951.65^{\#}}$$

ANS. $952^{\#}$ ✓

SIMILAR TO 14-83