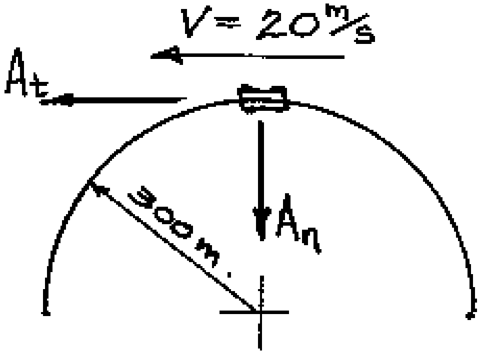
HIBBELER PROB. 12-102

USING RADIUS of CURVATURE.



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

$\vec{A}_n = \vec{\omega} \times \vec{\omega} \times \vec{r}$ $A_n = r\omega^2$

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

sub. $\omega = \frac{V}{r}$

A_n - force pulling toward center ∴ a function of radius $\therefore A_n = \frac{V^2}{r}$

A_t = tangential component only exists if there is an angular acceleration or a change in linear speed tangent to the arc path.

TANGENTIAL COMPONENT

in same direction of V

$\therefore V = V_o + at$

$\frac{V_f - V_o}{t} = a_t$

$\frac{27\frac{m}{s} - 15\frac{m}{s}}{3s} = a_t = 4\frac{m}{s^2}$

NORMAL COMPONENT

perpendicular to path

$A_n = \frac{V^2}{r} = \frac{(20\frac{m}{s})^2}{300\,m}$

$A_n = 1.33\,\frac{m}{s^2}$

$\vec{A} = A_n + A_t$

or $|\vec{A}| = \sqrt{(1.33)^2 + (4)^2} = 4.215$

$A \doteq 4.2\,\frac{m}{s^2}$

MILANO