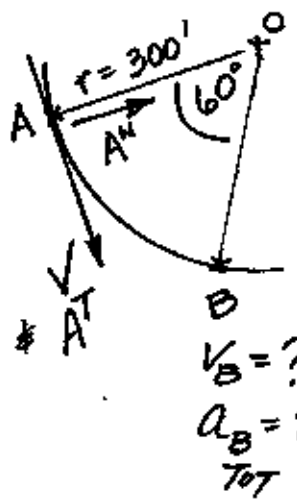
HIBBELER

12-118



$$a_A^T = 0.3t \ \tfrac{ft}{s^2} = \frac{dv}{dt}$$

$$\int_0^t 0.3t\,dt = \int_0^v dv$$

$$\frac{0.3t^2}{2} = v = \frac{ds}{dt}$$

$$\int_0^t 0.15t^2\,dt = \int_0^s ds$$

$$0.15\frac{t^3}{3} = \boxed{s = 0.05t^3}$$

ARC PATH FROM A TO B $\approx r\theta$, where θ = radians

$60°\left(\frac{\pi}{180°}\right) = \frac{\pi}{3}$ radians

$$\therefore s \doteq 300'\left(\frac{\pi}{3}\right) = 100\pi$$

$$100\pi = 0.05t^3 \quad \therefore t = \sqrt[3]{\frac{100\pi}{0.05}} = 18.453\ s$$

when $t = 18.453$ s

$v = 0.15t^2 = 51.075\ ft/s$ $\quad \boxed{V \doteq 51\ ft/s}$

$a^T = 0.3t = 5.536\ ft/s^2$ TANGENT TO PATH

NEED TO CONSIDER NORMAL ACCELERATION

$$a^N = \omega^2 r = \frac{V^2}{r} = \frac{(51.075)^2}{300'} = 8.695\ ft/s^2$$

$$A^{TOT} = \vec{A}^N + \vec{A}^T = \sqrt{(5.536)^2 + (8.695)^2} = 10.31\ ft/s^2$$

$$\boxed{\begin{aligned} V_B &= 51\ ft/s \\ A_B^{TOT} &= 10.31\ ft/s^2 \end{aligned}}$$

MILANO