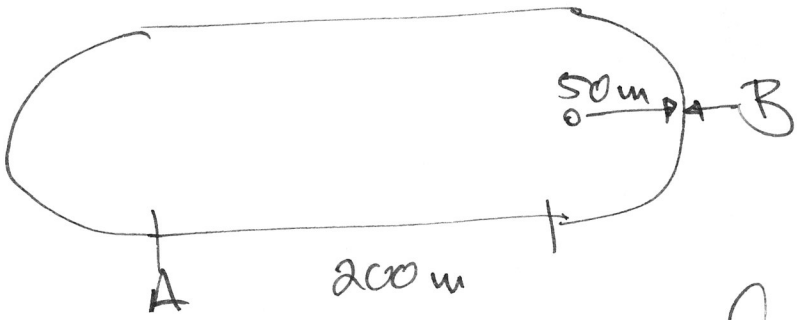
Given:



$a_t = 0.6\ m/s^2$

Req'd: $\bar{v}$ & $\bar{a}$ in e_n & e_t coord.

Assumptions: $a_t = const$

Strategy: write expressions for $\bar{v}$ & $\bar{a}$ in n/t, seek terms. will probably have to use kinematics from previous sections to find locations & speeds. Will also need to know how far from A → B.

Estimate: Circle has circumference of $6R \cong 300\ m$.

$\Rightarrow$ As A → B $= 200\ m + \frac{300}{4}\ m \cong 275\ m$

given $a_t = .6 \Rightarrow v|_{t=10s} = 6\ m/s$ $v|_{t=20s} = 12\ m/s$

since $v_{ave} \cong \frac{1}{2} v_f \Rightarrow s|_{t=10s} = 3\frac{m}{s}\,10s = 30\ m$ $s|_{t=20} = 6\frac{m}{s}\cdot 20s = 120\ m$

for $v|_{t=30} = 18\ m/s$ $s|_{30} = 270\ m$ & $v|_{t=40s} = 24\ m/s$ $s|_{40} = 480\ m$.

Estimate: cont previous page $\Rightarrow t \cong 30s$, $v_{peak} \cong 18 m/s$
that sets same boundaries for me

Soln: $\bar{v} = v_t \hat{e}_t$, $\bar{a} = \frac{dv}{dt}\hat{e}_t + \frac{v^2}{\rho}\hat{e}_n$ → could be $\rho\omega^2$

$\hookrightarrow a_t = 0.6 m/s^2$

given that $a_t = cnst$

$\Rightarrow \int a\,dt = \int dv \Rightarrow \underbrace{v_0}_{0} + at = v(t) \Rightarrow at = \frac{ds}{dt}$

$\Rightarrow \int_{t=0}^{t_B} at\,dt = \int_{s_0=0}^{s_B} ds \Rightarrow \frac{at_B^2}{2} = s_B$

$s_B = 200 m + \frac{2\pi R}{4} = 200 m + \underbrace{\frac{2\pi(50m)}{4}}_{78.5m} = 278.5 m = s_B$

$\Rightarrow \boxed{\frac{2s_B}{a}} = t_B = \sqrt{\frac{2(278.5m)}{.6 m/s^2}} = \boxed{928.3 s^2} = 30.5 s$

$\Rightarrow v\Big|_{t=30.5s} = 0.6 m/s^2 \cdot 30.5 s = 18.2 m/s = v_t$ $\boxed{\bar{v} = 18.2 m/s\,\hat{e}_t}$

$\bar{a} = 0.6 m/s^2 \hat{e}_t + \frac{v^2}{\rho}\hat{e}_n = 0.6 m/s^2 \hat{e}_t + \frac{(18.2 m/s)^2}{50 m}\hat{e}_n = \boxed{0.6 m/s^2 \hat{e}_t + 6.63 m/s^2 \hat{e}_n}$

Discussion: Fits my estimate way to well. Never the less I see no problems. From this accel I could calculate the forces acting on the car if need including friction in the tangential & normal directions.