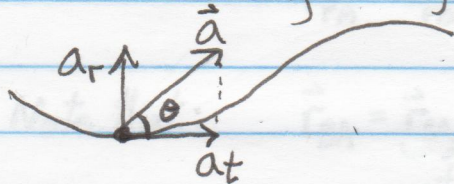


## Tangential & Radial Acceleration

- For 2-D motion along curvy path

PPT 3



SWF 4.16

Ex) PPT 4 Car passes over a rise in street shaped like an arc with  $r = 500\text{m}$ . Its  $a_t = 0.3\text{m/s}^2$  and  $v = 6.0\text{m/s}$ .

Find magnitude and direction of total  $\vec{a}$ .

$$\vec{a} = 0.3\hat{\theta} + \frac{v^2}{r}\hat{r}$$

$$\frac{v^2}{r} = \frac{6^2}{500} = .072\text{m/s}^2$$

$$|\vec{a}| = \sqrt{0.3^2 + .072^2} = \sqrt{0.09 + 5.18 \times 10^{-3}}$$

$$|\vec{a}| = 0.3085\text{m/s}^2$$

$$\text{Direction: } \theta = \tan^{-1}\left(\frac{a_r}{a_t}\right) = \tan^{-1}\left(\frac{.072}{.3}\right) = -13.5^\circ$$

