20-P-KM-AF-017

Curvilinear Tangential Motion. Intermediate

Q: A famous certain famous skateboarder is travelling a long a curved path. If his velocity could be described as $v = At$, if the acceleration makes an angle of $B°$ with the tangential component. What is radius of curvature of his path at time = C?

A:

$$a_t = \dot{v} = A = a\cos(B) \Rightarrow a = \frac{A}{\cos(B)}$$

$$a_n = \frac{v^2}{\ell} = a\sin(B) = \frac{(A \cdot C)^2}{\ell}$$

$$\ell \cdot \frac{A}{\cos(B)} \sin(B) = (AC)^2$$

$$\ell A \tan(B) = (AC)^2$$

$$\ell = \frac{(AC)^2}{A\tan(B)}$$