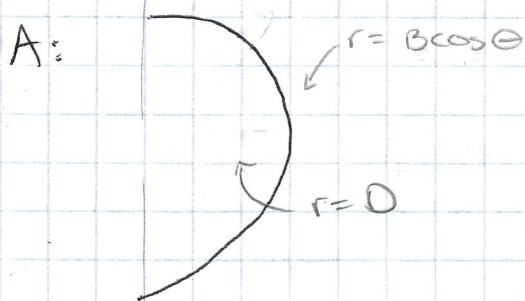# 20-P-FA-AF-006

E.o.M Cylindrical Components: Intermediate

Q: The forked rod moves a smooth M kg particle around the shaped described by $r = B\cos\theta$. If $\dot\theta = Ct$, find the force the rod exerts on the particle assuming $r = D$ and $t = E$ s. Assume they only make contact on one side.

magnitude

A:

$r = B\cos\theta$

$r = 0$

this isn't the digram

$r = D = \sqrt{3 \cdot 6}$

$r = B\cos\theta = 2 \cdot \sqrt{6}\ \cos\theta$

$\dfrac{\sqrt{3}\sqrt{6}}{\sqrt{6} \cdot 2} = \cos\theta \implies \theta = \dfrac{\pi}{6}$

table

$\theta = \pi/6$	$r = B\cos\theta$
$\dot\theta = C \cdot E$	$\dot r = -B\sin\theta\,\dot\theta$
$\ddot\theta = C$	$\ddot r = -B\cos\theta\,\dot\theta^2 + -B\sin\theta\,\ddot\theta$

$a_r = \ddot r - r\dot\theta^2$

$a_\theta = r\ddot\theta + 2\dot r\dot\theta$

$\nearrow \Sigma F_r = Ma_r = N\sin(\psi) \implies N = \dfrac{Ma_r}{\sin(\psi)}$

$\nwarrow \Sigma F_\theta = F + N\cos(\psi) = Ma_\theta$

$F = Ma_\theta - N\cos(\psi)$

$r = B\cos\theta$