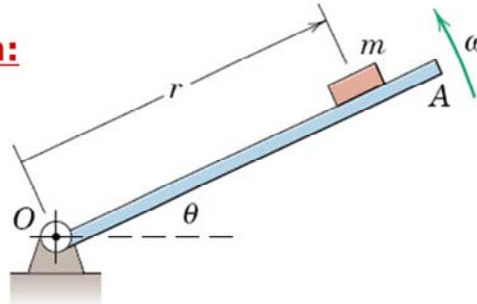


**Curvilinear Motion:
Exercise 3**



Link OA rotates about a horizontal axis through **O** with constant **angular velocity** $\omega = 3 \text{ rad/s}$. When $\theta = 0^\circ$, a small block of **mass** m is placed on it at a radial **distance** $r = 18 \text{ in}$. When $\theta = 50^\circ$, the block begins to slip.

Determine the **coefficient of static friction** μ_s between the block and link.

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$\Sigma F_\theta = ma_\theta: N - mg \cos \theta = 0$
 $N = mg \cos \theta$
 $\Sigma F_r = mar: \mu_s N - mg \sin \theta = m(0 - r\omega^2)$

Eliminate N :

$$\mu_s = \tan \theta - \frac{r\omega^2}{g \cos \theta}$$

Numbers: $\mu_s = \tan 50^\circ - \frac{(18/12)(3)^2}{32.2 \cos 50^\circ} = \underline{0.540}$