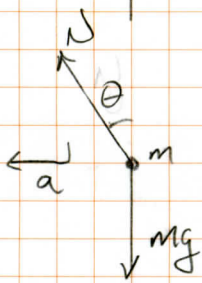
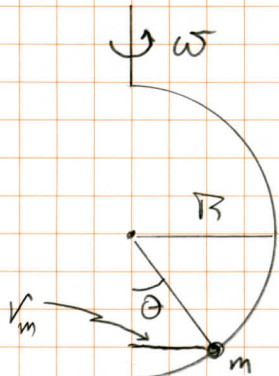


T3 PR 5.63

T3 5-63 A 100g BEAD SLIDES ON A SEMI-CIRCULAR WIRE WITH  $R=10\text{ cm}$  ROTATING AT 2 rps. FIND  $\theta$ 'S FOR WHICH IT'S STATIONARY.



$$a = m \frac{v^2}{r_m}$$

$$= \frac{m (v_m \omega)^2}{r_m}$$

$$a = m r_m \omega^2$$

$$r_m = R \sin \theta$$

$$R = 10\text{ cm}$$

APPLY NSL:

$$\sum F_{\text{VERT}} = m a_{\text{VERT}}^0$$

$$N \cos \theta - mg = 0$$

$$N = \frac{mg}{\cos \theta}$$

$$\sum F_{\text{HORIZ}} = m a_{\text{HORIZ}}$$

$$N \sin \theta = ma$$

$$\left( \frac{mg}{\cos \theta} \right) \sin \theta = m r_m \omega^2$$

$$\frac{g \sin \theta}{\cos \theta} = (R \sin \theta) \omega^2$$

$$\cos \theta = \frac{g}{R \omega^2}$$

$$\omega = 2 \frac{\text{REV}}{\text{SEC}} \left( \frac{2\pi \text{RAD}}{1 \text{REV}} \right) = 4\pi \frac{\text{RAD}}{\text{SEC}}$$

$$\theta = \cos^{-1} \left( \frac{g}{R \omega^2} \right)$$

$$\theta = \cos^{-1} \left( \frac{9.8}{(10.1)(16\pi^2)} \right)$$

$$\boxed{\theta = 51.6^\circ}$$