

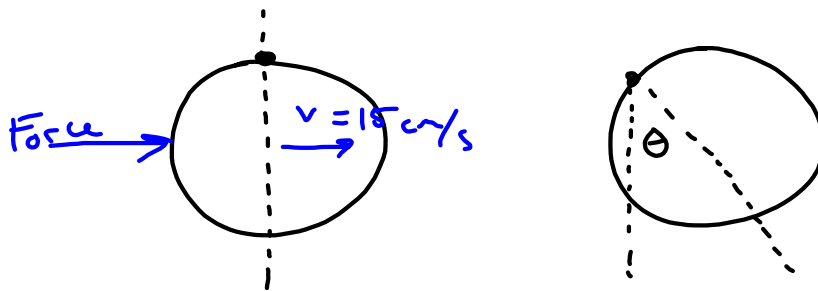
TIPERs

- B6 - RTØ8

$$E = F, B = D, C, A$$

- B6 - QRT29

A solid sphere of radius 10 cm is allowed to rotate freely about an axis. The sphere is given a sharp blow so that its center of mass starts from the position shown in the following figure with speed 15 cm/s. What is the maximum angle that the diameter makes with the vertical?

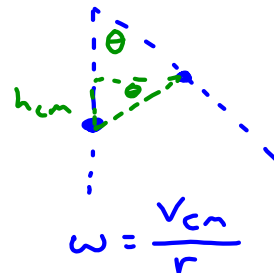


$$I = \frac{2}{5} MR^2 + md^2$$

$$= \frac{2}{5} M(0.1\text{ m})^2 + M(0.1\text{ m})^2$$

$$K = U_{f-cm}$$

$$\frac{1}{2} I \omega^2 = M a_g h_{cm}$$



$$\frac{1}{2} \left[ \frac{2}{5} (m)(0.1\text{ m}) + (m)(0.1\text{ m})^2 \right] \frac{(0.15\text{ m/s})^2}{0.1\text{ m}} = m(9.8\text{ m/s}^2)(0.1\text{ m})(1 - \cos \theta)$$

$$\frac{7}{10} (0.0225) = (0.98)(1 - \cos \theta)$$

$$1 - \cos \theta = 0.163$$

$$\cos \theta = 0.984$$

$$\theta = \cos^{-1}(0.984)$$

$$\theta = 10.3^\circ$$