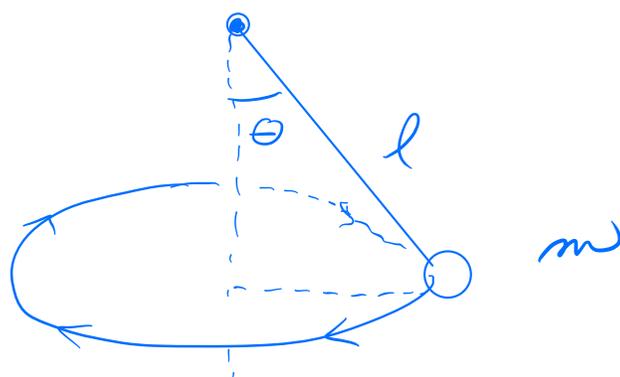


Example: the conical pendulum



$$\theta = 30^\circ$$

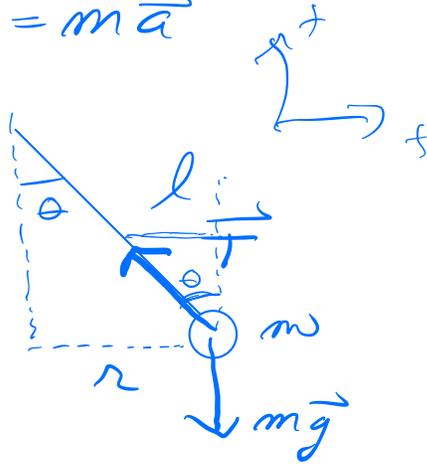
$$l = 0.6 \text{ m}$$

$$m = 2 \text{ kg}$$

Q: How quickly (rev/sec) must it turn to have an angle of 30° from the vertical?

Where to start?

Apply $\Sigma \vec{F} = m\vec{a}$



$$l = 0.600 \text{ m}$$

$$\theta = 30^\circ$$

$$r = l \sin 30^\circ$$

$$r = 0.300 \text{ m}$$

$$\Sigma F_x = ma_x$$

$$-T \sin \theta = -\frac{mv^2}{r}$$

$$\Sigma F_y = ma_y$$

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

$$T = mg / \cos \theta$$

$$\left(\frac{mg}{\cos \theta} \right) \cdot \sin \theta = \frac{mv^2}{r} \Rightarrow v = \sqrt{rg \tan \theta}$$

$$v = \sqrt{(0.300 \text{ m})(9.80 \text{ m/s}^2) \tan 30^\circ}$$

$$v = 1.30 \text{ m/s} \checkmark$$

$$\text{Period} = P = 2\pi r / v = 1.447 \text{ s}$$

$$f = 1/P = 0.69 \text{ rev/s}$$