

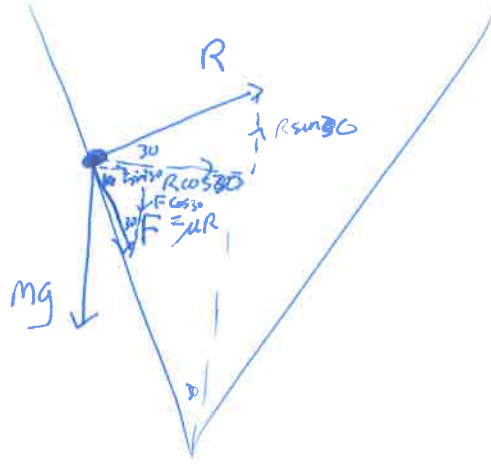
2006

b).

$$\omega = 4\pi$$

$$\mu = \frac{1}{4}$$

$$\text{mass } l = ?$$



$$\uparrow \downarrow : \quad R \sin 30 = mg + F \cos 30$$

$$R \sin 30 = mg + \mu R \cos 30$$

$$R \left( \frac{1}{2} - \frac{1}{4} \cdot \frac{\sqrt{3}}{2} \right) = mg$$

$$R \left( \frac{4 - \sqrt{3}}{8} \right) = mg$$

$\rightarrow$

$$R \cos 30 + F \sin 30 = m r \omega^2$$

$$R \cos 30 + \mu R \sin 30 = m r \omega^2$$

$$R \left( \frac{\sqrt{3}}{2} + \frac{1}{4} \cdot \frac{1}{2} \right) = m r 16\pi^2$$

$$R \left( \frac{\sqrt{3}}{2} + \frac{1}{8} \right) = m r 16\pi^2$$

$$\frac{mg}{\left( \frac{1}{2} - \frac{\sqrt{3}}{8} \right)} \left( \frac{\sqrt{3}}{2} + \frac{1}{8} \right) = m r 16\pi^2$$

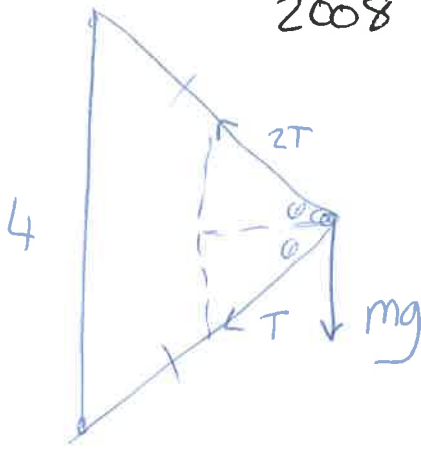
$$mg \left( \frac{16 + 17\sqrt{3}}{13} \right) = m r 16\pi^2$$

$$0.2169 = r$$

$$l = ? \quad r = l \sin 30 \quad l = 2r = 0.43$$

b.

2008



$$\uparrow \downarrow : 2T \sin \theta = mg + T \sin \theta$$

$$T \sin \theta = mg \quad (1)$$

$$\rightarrow \leftarrow : 2T \cos \theta + T \cos \theta = m r \omega^2$$

$$3T \cos \theta = m r \omega^2 \quad (2)$$

$$(1) \div (2)$$

$$\frac{T \sin \theta}{3T \cos \theta} = \frac{mg}{m r \omega^2}$$

$$\frac{\tan \theta}{3} = \frac{g}{r \omega^2}$$

$$r \omega^2 = \frac{3g}{\tan \theta}$$

$$r \omega^2 = 3g \cdot \frac{r}{2}$$

$$\omega = \sqrt{\frac{3g}{2}}$$

