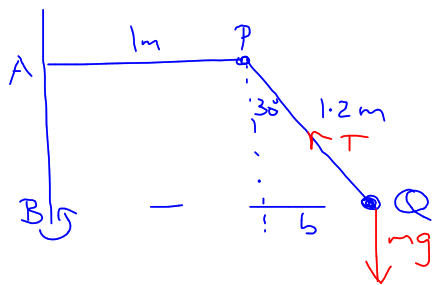
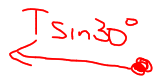


3/



$$\begin{aligned}
 r &= 1 + b \\
 &= 1 + 1.2 \sin 30^\circ \\
 &= 1.6
 \end{aligned}$$

horizontal $F = \frac{mv^2}{r}$



$$\begin{aligned}
 T \sin 30^\circ &= \frac{mv^2}{r} \\
 \frac{T}{2} &= \frac{mv^2}{r}
 \end{aligned}$$

$$\frac{mg}{\sqrt{3}} = \frac{mv^2}{r}$$

$$v^2 = \frac{\frac{mg}{\sqrt{3}} r}{m}$$

$$v^2 = \frac{(9.8)(1.6)}{\sqrt{3}}$$

$$\underline{v = 3.01 \text{ m/s}}$$

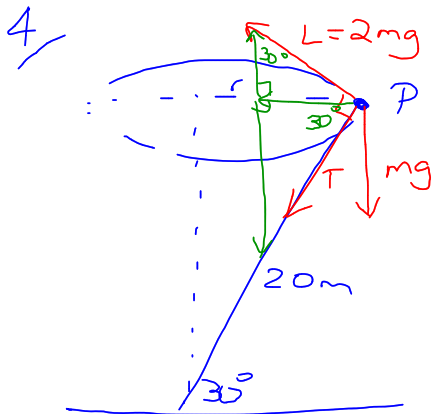
vertical $F = 0$



$$\begin{aligned}
 T \cos 30^\circ - mg &= 0 \\
 \frac{\sqrt{3}T}{2} &= mg
 \end{aligned}$$

$$T = \frac{2mg}{\sqrt{3}}$$

$$\begin{aligned}
 \text{b) } T &= \frac{2(3)(9.8)}{\sqrt{3}} \\
 &= \underline{33.9 \text{ N}}
 \end{aligned}$$



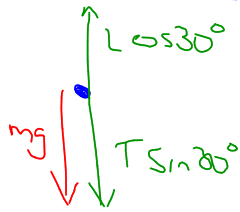
$$r = 20 \cos 30^\circ$$

$$= 10\sqrt{3}$$

horizontal $F = \frac{mv^2}{r}$

$$L \sin 30^\circ + T \cos 30^\circ = \frac{mv^2}{r}$$

vertical $F = 0$



$$L \cos 30^\circ - T \sin 30^\circ - mg = 0$$

$$(2mg) \left(\frac{\sqrt{3}}{2} \right) - T \left(\frac{1}{2} \right) - mg = 0$$

$$\frac{T}{2} = (\sqrt{3} - 1)mg$$

$$T = 2(\sqrt{3} - 1)(5)(9.8)$$

$$= \underline{71.7 \text{ N}}$$

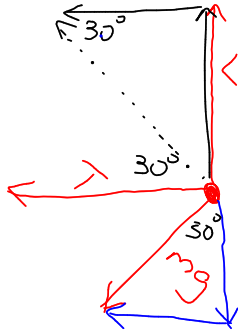
$$(ii) (2mg)\left(\frac{1}{2}\right) + 2(\sqrt{3}-1)mg\left(\frac{\sqrt{3}}{2}\right) = \frac{mv^2}{r}$$

$$g + (3-\sqrt{3})g = \frac{v^2}{10\sqrt{3}}$$

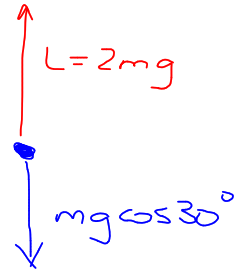
$$v^2 = 10\sqrt{3}(4-\sqrt{3})(9.8)$$

$$v = \underline{19.62 \text{ m/s}}$$

(f)



Forces // $L = \frac{mv^2}{r} \sin 30^\circ$



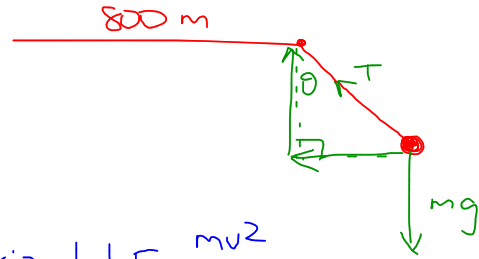
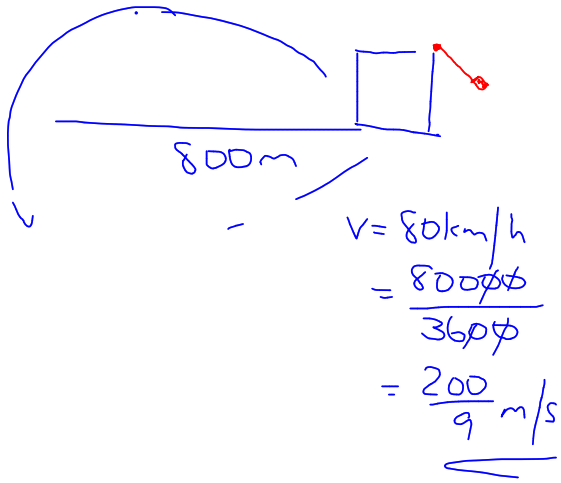
$$2mg - mg \cos 30^\circ = \frac{mv^2}{r} \sin 30^\circ$$

$$2g - \frac{\sqrt{3}g}{2} = \frac{v^2}{2r}$$

$$v^2 = 2rg \left(2 - \frac{\sqrt{3}}{2} \right)$$

$$= 2(10\sqrt{3})(9.8) \left(2 - \frac{\sqrt{3}}{2} \right)$$

S



horizontal $F = \frac{mv^2}{r}$

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

Vertical $F = 0$

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

$$\frac{T \sin \theta}{T \cos \theta} = \frac{mv^2}{r} \times \frac{1}{mg}$$

$$\tan \theta = \frac{v^2}{gr}$$

$$= \left(\frac{200}{9} \right)^2 \times \frac{1}{(9.8)(800)}$$

$$\theta = \underline{3.6^\circ}$$