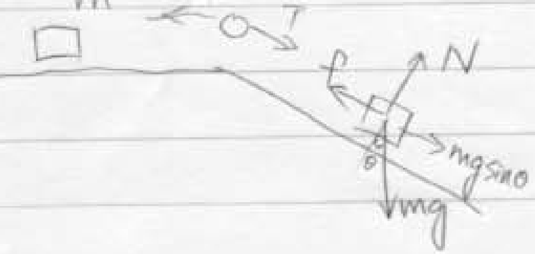
6. (a)



$N = mg\cos\theta$

the maximal static friction is $f_s = \mu_s N = 2.$

$$T + f = mg\sin\theta$$

$$T_{min} = mg\sin\theta - f_{s\,max} = 2.1\,N$$

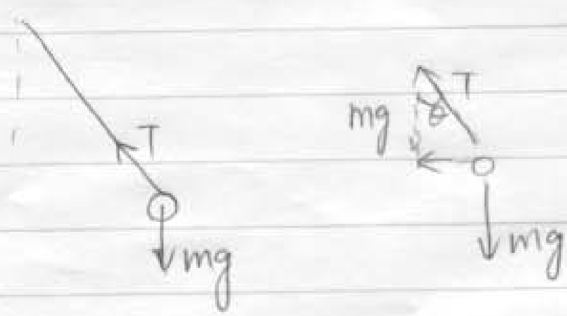
so it remain at rest.

(b) If it has an initial velocity, then the friction is kinetic friction

$$f_k = \mu_k N = \mu_k mg\cos\theta = 1.95\,N$$

$$\begin{cases} \dfrac{mg\sin\theta - f_k - T}{m} = \dfrac{T - \mu_k m' g}{m'} \\ a = \dfrac{mg\sin\theta - f_k - T}{m} \end{cases} \Rightarrow a = -1.41\,m/s^2 \quad \text{slows down}$$

7



$$\begin{cases} T\sin\theta = m\omega^2 r = m\omega^2 l \\ T\cos\theta = mg \end{cases} \Rightarrow \tan\theta = \frac{\omega^2 l}{g}.$$

$$\omega = \sqrt{\frac{g}{l}\tan\theta} \Rightarrow T = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{l}{g}\cot\theta}$$

1st limit $\theta = \frac{\pi}{2}$

$T \to 0$ it must travel at infinite velocity to support the weight.

2nd limit $\theta = 0$.

$T \to \infty$ it can stay static