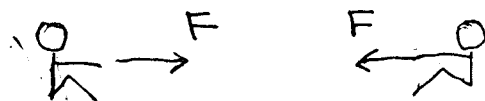


a) Frilegeme - diagrammer.



$$\vec{F}_B = -\vec{F}_A$$

$$a_1 = \frac{F}{m_1} \Rightarrow s_1 = \frac{1}{2} \left(\frac{F}{m_1} \right) t_1^2 \quad (1)$$

$$a_2 = \frac{F}{m_2} \Rightarrow s_2 = \frac{1}{2} \left(\frac{F}{m_2} \right) t_1^2$$

$$L = s_1 + s_2 = \frac{F}{2} \left(\frac{1}{m_1} + \frac{1}{m_2} \right) t_1^2 = \frac{F}{2} \frac{m_1 + m_2}{m_1 m_2} t_1^2$$

$$t_1 = \left[\frac{2L}{F} \frac{m_1 m_2}{m_1 + m_2} \right]^{1/2}$$

$$(1) \Rightarrow s_1 = \frac{1}{2} \frac{F}{m_1} \frac{2L}{F} \frac{m_1 m_2}{m_1 + m_2} = \frac{m_2}{m_1 + m_2} L$$

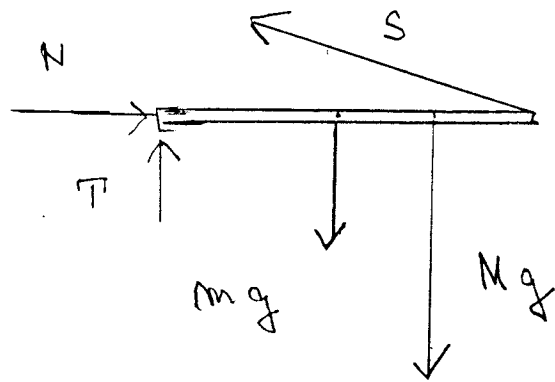
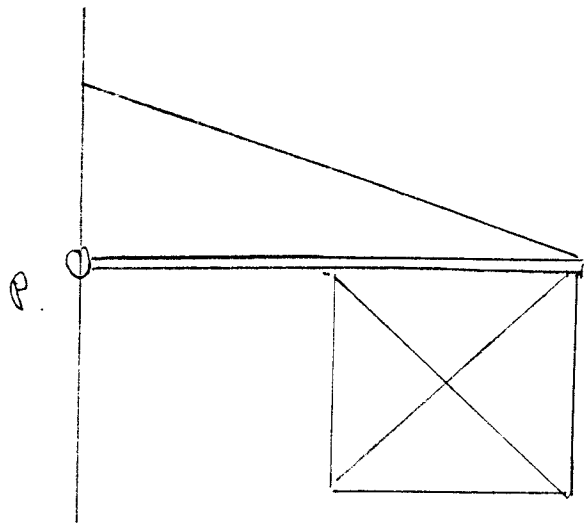
$$s_1 \approx \begin{cases} L & m_1 \ll m_2 \\ L/2 & m_1 = m_2 \text{ (Symmetric)} \\ 0 & m_1 \gg m_2 \end{cases}$$



b) Ingen ytre kraft $\Rightarrow$ Massesenter i ro!
 Momentet = massesenter.

$$s_1 = \bar{x} = \frac{1}{m_1 + m_2} [0 \cdot m_1 + L \cdot m_2] = \frac{m_2}{m_1 + m_2} L$$

Uafhængig af styrke og tidsafhængighed af F.



Solve for S. For longer null kraft - moment om P

$$0 = mg \cdot \frac{L}{2} + Mg \left(\frac{L}{2} + \frac{L}{4} \right) - S \cdot L \sin \theta$$

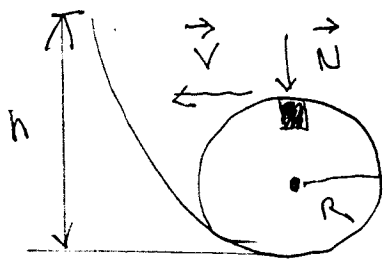
$$S L \cdot \frac{1}{2} = g L \left[\frac{m}{2} + \frac{3}{4} M \right] \Rightarrow$$

$$\underline{S = \left[m + \frac{3}{2} M \right] g}$$

Ans: N og T elimineres umiddelbart ved å velge aks
gjennom P.

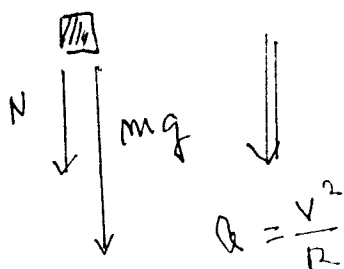
3.

a)

Konserverativ trykgele kraft $\Rightarrow$ 

$$mgh = mg \cdot 2R + \frac{1}{2}mv^2$$

$$\underline{v = \sqrt{2g(h-2R)}}.$$



$$N + mg = mv^2/R$$

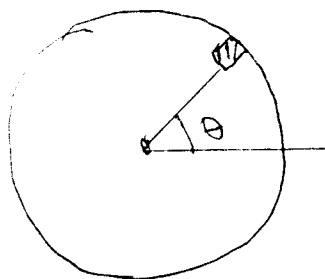
$$= \frac{2mg}{R}(h-2R) \Rightarrow$$

$$\underline{N = mg \left[\frac{2h}{R} - 5 \right]}.$$

For fullständig sirkellbane må

$$N \geq 0 \quad \therefore \quad \underline{h > h_0 = \frac{5}{2}R}$$

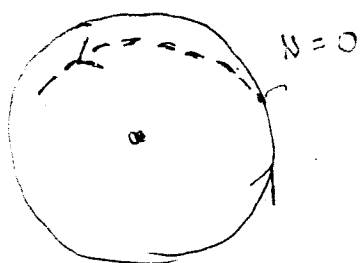
b)



$h < h_0$ Ved gitt θ vil
 $v(h) < v(h_0)$

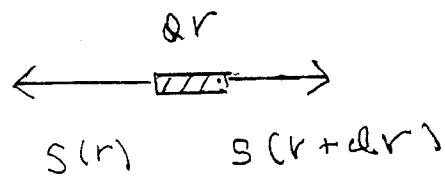
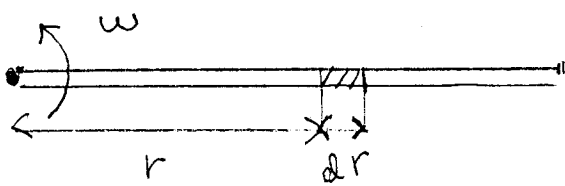
$$N(h) = \frac{mv^2}{R} - mg \sin \theta$$

Når verdien 0 for $\theta = \pi/2$.



Kulen går inn i en
 parabolisk bane (som ved
 skrått kast)

a)



masse : dr : $dm = \frac{m}{L} dr$

$$\underbrace{S(r) - S(r+dr)}_{\text{Netto kraft innover}} = -dS = \underbrace{dm}_{\text{masse}} \cdot \underbrace{r \omega^2}_{\text{akseler.}} \Rightarrow$$

Netto kraft innover

masse $\times$ akseler.

$$\underline{dS = - \left(\frac{m \omega^2}{L} \right) r dr}$$

b) Integrasjon :

$$S = - \frac{m \omega^2}{2L} r^2 + C.$$

C bestemmes av randbetingelse

$$0 = S(r=L) = - \frac{m \omega^2 L^2}{2L} + C \therefore C = \frac{m \omega^2}{2L} L^2$$

$$\underline{S = \frac{m \omega^2}{2L} (L^2 - r^2)}$$

Kontroll :

$$S(r=L) = 0$$

$$S(r=0) = m \omega^2 \left(\frac{L}{2} \right)$$

$$= m a_{ms} \text{ som ventet.}$$

Kan bestemmes som alternativ randbeting.

