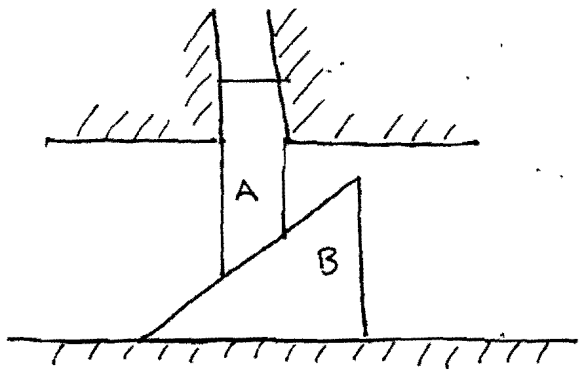
Dis 6A 6.1

1.77)

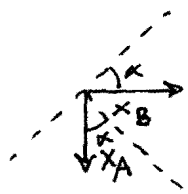


$m_B/m_A = \eta$

what is the acceleration of A and B ?

m_A

$m_A g - N\cos\alpha = m_A w_A$



m_B

$N\sin\alpha = m_B w_B$

$x_B \sin\alpha = x_A \cos\alpha$

by continuity

$\Rightarrow w_B = w_A \cot\alpha$

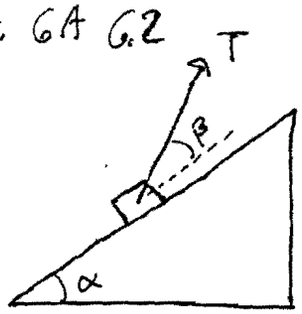
$m_A g = m_A w_A + m_B w_B \cot\alpha$

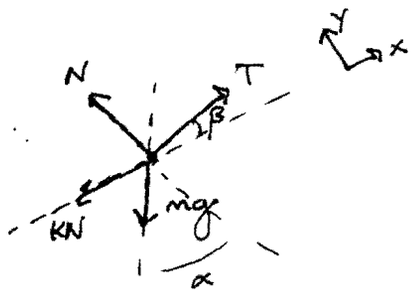
$$w_A = g \frac{1}{1 + \eta \frac{w_B}{w_A} \cot\alpha}$$

$$\boxed{w_A = g \frac{1}{1 + \eta \cot^2\alpha}}$$

$$\boxed{w_B = \frac{g}{\tan\alpha + \eta \cot\alpha}}$$

1.67) Dis. 6A 6.2





$$\sum F_x = T\cos\beta - KN - mg\sin\alpha = ma$$

$$\sum F_y = N + T\sin\beta - mg\cos\alpha = 0$$

$$T\cos\beta - Kmg\cos\alpha + KT\sin\beta - mg\sin\alpha = ma$$

$$T = \frac{ma + mg[\sin\alpha + K\cos\alpha]}{K\sin\beta + \cos\beta}$$

$\frac{\partial T}{\partial \beta} = 0$ same as $\frac{\partial}{\partial \beta}[K\sin\beta + \cos\beta] = 0$

$$\boxed{K = \tan\beta_{min}}$$

$$T_{min} = \frac{ma + mg[\sin\alpha + K\cos\alpha]}{\cos\beta[1 + K^2]}$$

$\sin^2\beta + \cos^2\beta = 1$

$1 + \tan^2\beta = \sec^2\beta$

$\sqrt{1 + K^2} = \frac{1}{\cos\beta}$

$$\Rightarrow \boxed{T_{min} = \frac{ma + mg[\sin\alpha + K\cos\alpha]}{\sqrt{1 + K^2}}}$$