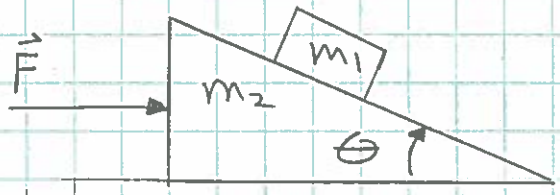
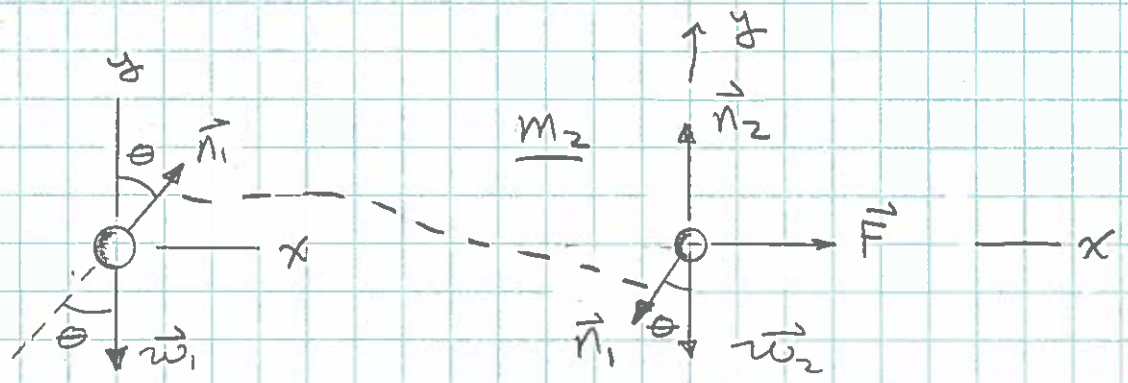


No friction

m_1 will not slip if its horizontal acceleration is the same as m_2's.

i.e. $a_{1x} = a_{2x} = a$

FBD



For m_1:

$$\Sigma F_x = n_1 \sin\theta = m_1 a_{1x} \qquad (1)$$

$$\Sigma F_y = n_1 \cos\theta - w_1 = m_1 a_{1y} = 0$$

$$\Rightarrow n_1 = \frac{m_1 g}{\cos\theta}$$

Put n_1 in eqn (1):

$$m_1 g \frac{\sin\theta}{\cos\theta} = m_1 a_{1x} \Rightarrow a_{1x} = g\tan\theta = a$$

Now, for m_2: where: $a_{2x} = a_{1x} = a$

$$\Sigma F_x = F - n_1 \sin\theta = m_2 a_{1x} = m_2 a$$

So:

$$F - \frac{m_1 g}{\cos\theta}\sin\theta = m_2 g\tan\theta$$

$$F = m_1 g\tan\theta + m_2 g\tan\theta$$

or,

$$F = (m_1 + m_2) g\tan\theta$$