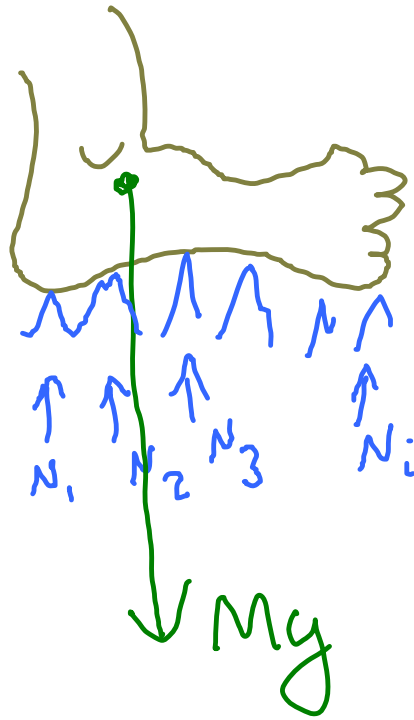


Physics 113 - September 26, 2013

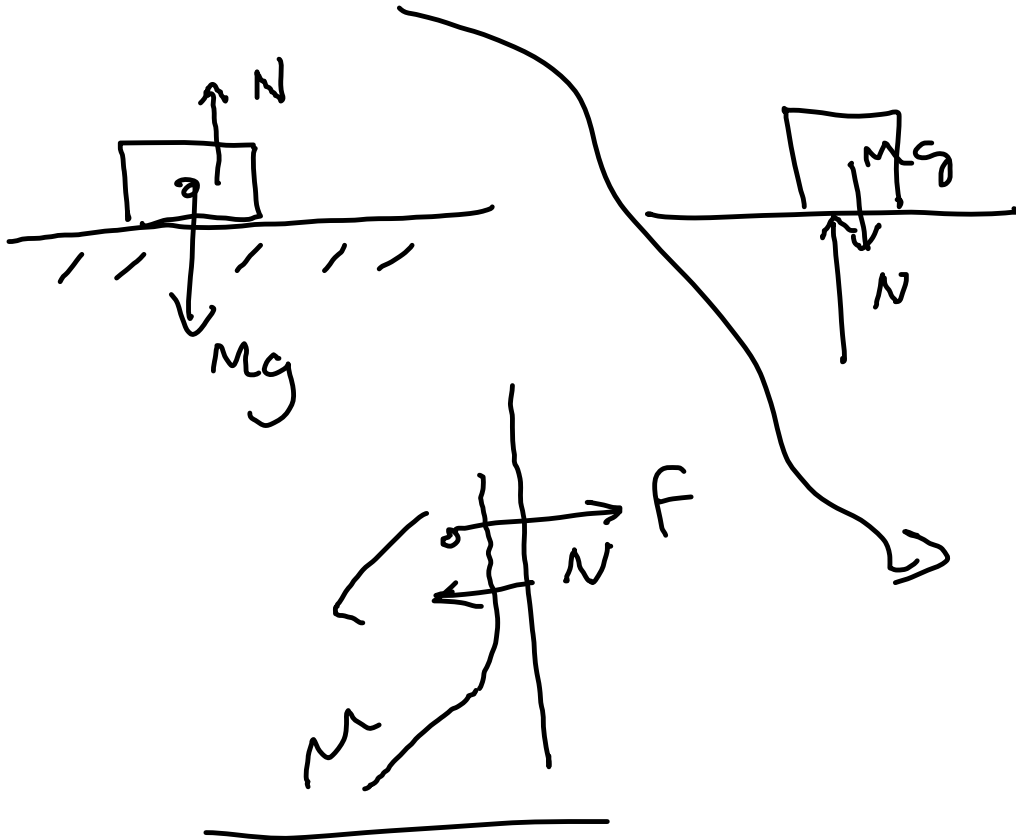
- Exam 1 - 1 week, Thurs. Oct. 3 - 0800-0930 Hubbell Aud.
 - "Cheat" sheet - 1 side 8.5x11 inch sheet
 - ↳ No Topological enhancement
 - Formula sheet
 - Q + A session
- No lectures in Hoyt next week
 - Tuesday lecture slides/Audio on class website
 - Thurs → Exam



$$\Sigma F = ma = 0$$

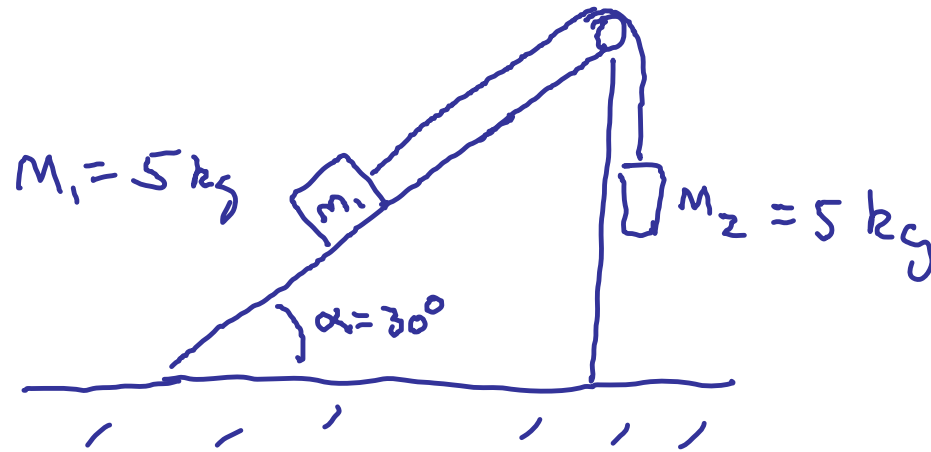
$$Mg = \sum_i N_i$$

Normal Force



$$N \perp F$$

Example



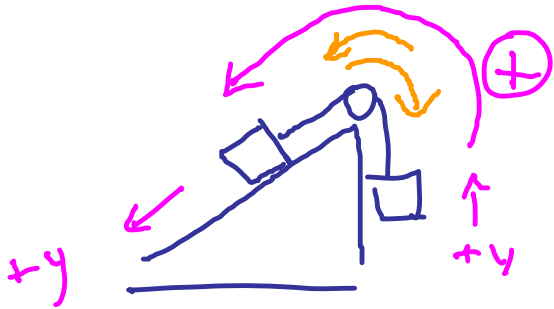
No Friction
on the plane

massless
frictionless
pulley

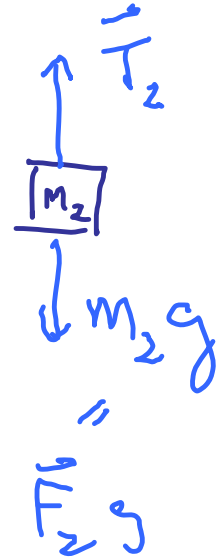
put in place and release

Describe the subsequent motion

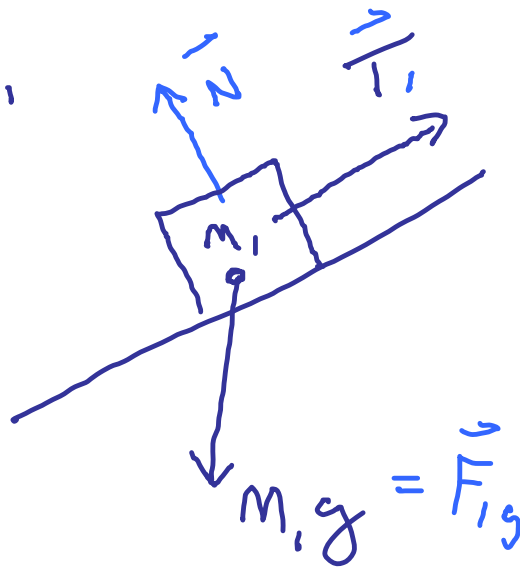
and
find the tension, T , in the rope



Free body diagram
FBD of M_2



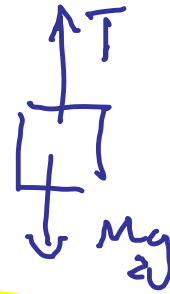
FBD for M_1



$$|\vec{T}_1| = |\vec{T}_2| = T$$

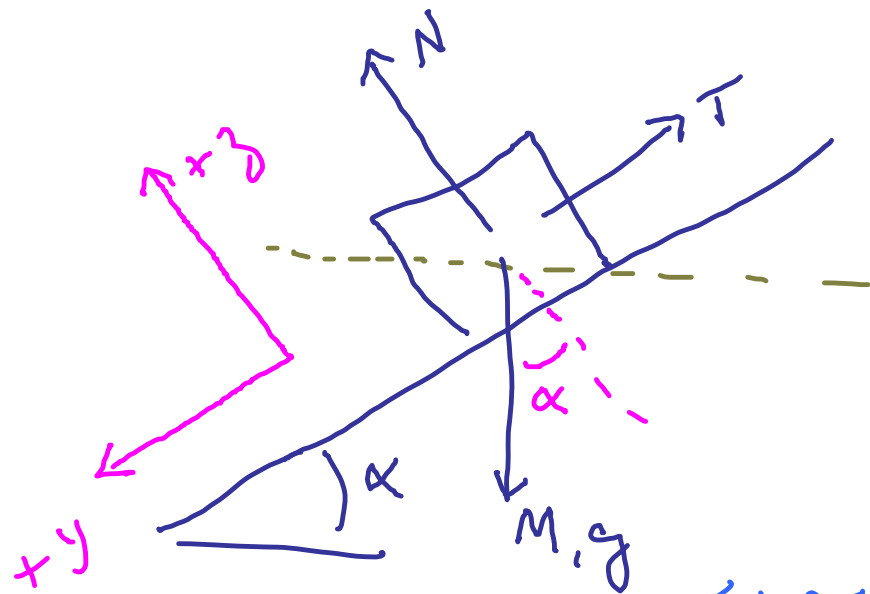
Apply Newton's 2nd law

$$\sum \vec{F} = m \vec{a}$$



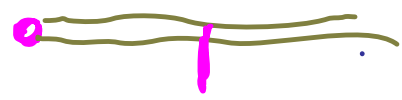
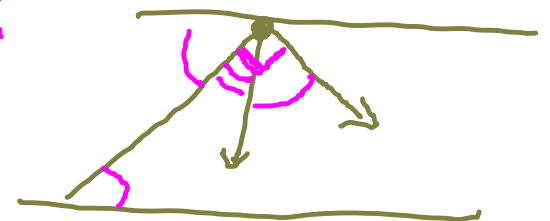
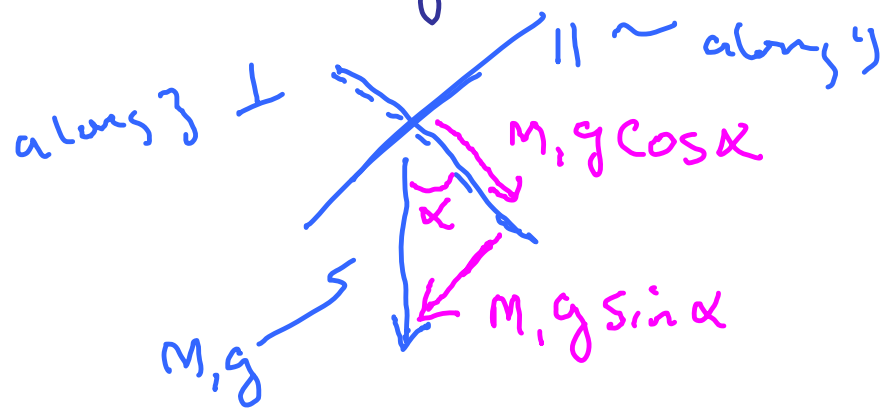
$$\sum F_y = m_2 a_y = T - m_2 g$$

? ?



$$\Sigma F_z = m_1 a_z = 0 = N - m_1 g \cos \alpha$$

$$\Sigma F_y = m_1 a_y = m_1 g \sin \alpha - T$$





3 eqns 3 unknowns \rightsquigarrow Soluble

want a_y, T

$$a_y = \frac{m_1 g \sin \alpha - m_2 g}{m_1 + m_2}$$

$$T = \frac{m_1 m_2 g (1 + \sin \alpha)}{m_1 + m_2}$$

end of material for exam!

check units ✓

limiting cases

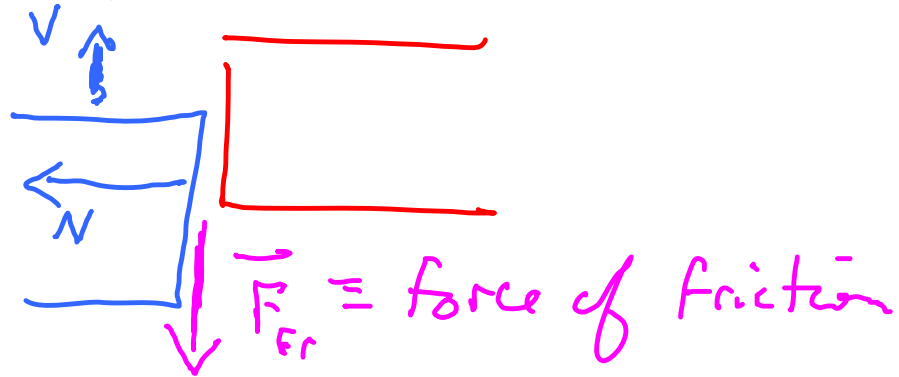
$$m_1 \gg m_2$$

$$m_2 \gg m_1$$

$$\alpha = 90^\circ$$



Friction



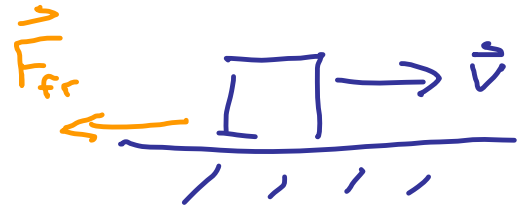
Force of kinetic friction \equiv force of friction between two Moving Surfaces

Proportional to

$$|\vec{F}_{fr}| \propto |\vec{N}|$$

$$|\vec{F}| = \mu_k |\vec{N}|$$

Coefficient of kinetic friction



Static Friction \equiv Force of Friction between
two surfaces at rest
w/ respect to each other

$$|\vec{F}_{fr}| \leq \mu_s |\vec{N}|$$

coefficient of
Static Friction

$\mu_s N \equiv$ limiting value
of STATIC
Friction force

$$F_{Fr} \leq \mu_s N$$

STATIC