NOTE: Look @ animation on Lecture Notes for 9/22

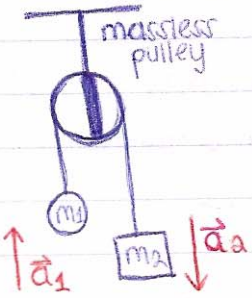
Ropes Connecting Multiple Accelerating Objects

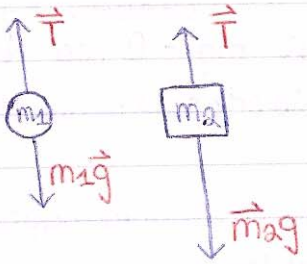
Draw free body diagrams for ea. object

Apply Newton's laws to ea. object

Acceleration of ea. object & tension of ea. part of rope = same

accelerations: same magnitude opp. direction





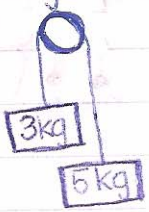
$\vec{T} + m_1\vec{g} = m_1\vec{a}$

$T - m_1g = m_1a$

$\vec{T} + m_2\vec{g} = m_2\vec{a}$

$T - m_2g = -m_2a$

use to solve



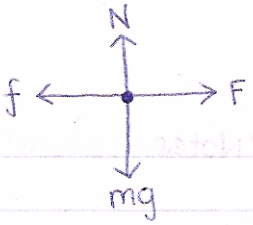
Ex. #34

a) tension of string?

b) a of ea. object?

c) distance moved after 1 s?

x: $F - f = ma = 0$
$F = f$
y: $N - mg = 0$
$N = mg$



Forces of Friction

Contact b/w bodies w/a Rel. Vel. Produces Friction

Friction proportional to the normal force

Force of static friction generally greater than force of kinetic friction

Coefficient of friction μ depends on the surfaces in contact

Direction of fric. force is opposite the direction of motion

Coefficients of friction are nearly independent of the area of contact

$f_s = -\vec{F}$ Static Friction f_s

Static friction acts to keep the object from moving

If F increases, so does f_s

If F decreases, so does f_s

$f_s \leq \mu n$ where n = normal force vector

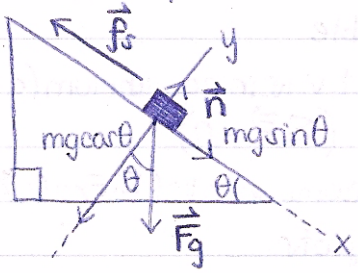
$f_k = \mu\vec{n}$ Kinetic Friction, f_k

The force of kinetic friction acts when the object is in motion

Direction of the f_k opposite to motion: opposes motion

Variation of coefficient of friction w/ speed will be ignored

Block on a Ramp



Axes rotated (on incline)

Direction of impending motion: down the plane

Friction acts up the plane (opposes motion)

Draw free body diagram