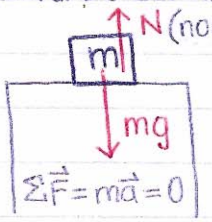
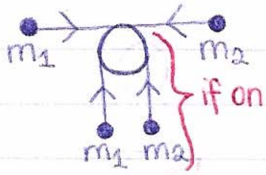
Lecture 8 Continued on 9/22 (Biswas)

N (normal force: always perpendicular to the surface the object sits on)

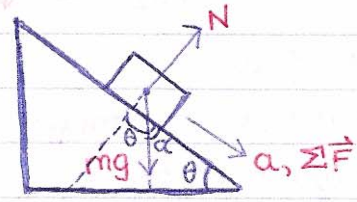


$N - mg = 0$ so $N = mg$ (weight)

So one scale on top of another, both scales read the same



forces equal in magnitude if on a pulley



rotate x axis to point in the same direction (or directly opposite) as a

$\alpha = 90° - \theta$

So, $N = mg\cos\theta$

$\Sigma F_x \rightarrow mg\sin\theta = ma$

So, $g\sin\theta = a$

If it's in free fall, $\sin\theta = \sin(90°) = 1$ and $g = a$, which makes

Class Notes - Lecture 9 (Ihas) 22 September 2009

NOTE: Copies of old exams and solutions @ Target Copy

Fundamental Forces in Nature

- Strong nuclear force — sun; H/atomic bombs
- Electromagnetic force — almost all the forces on us
- Weak nuclear force — mysterious and short range
- Gravity — the focus of our lectures so far

(strength ↓)

mechanics considers only: EF, gravity

all masses are attracting all other masses

Newton's Second Law

The acceleration of an object is directly proportional to the net force acting on it and inversely proportional to its mass, $\vec{a} \propto \Sigma\vec{F}/m$

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

Newton's Third Law

Equiv. to saying a single isolated force can't exist.

If object 1 and object 2 interact, the force exerted by object 1 on object 2 is equal in magnitude but opposite in direction to the force exerted by object 2 on object 1

$\vec{F}_{12} = -\vec{F}_{21}$

Hi-Lites

Masses of strings, ropes, pulleys are negligible

Object either at rest or moving w/ constant v is in equilibrium $(a=0)$

Net force acting on an object = 0 if $a=0$ $(\Sigma\vec{F}=0)$

Easier to work with equation in terms of components $(\Sigma F_x=0, \Sigma F_y=0)$