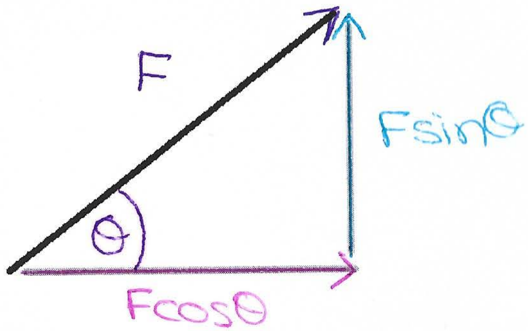
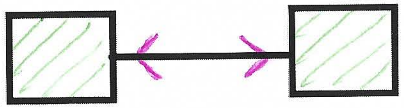
Forces Diagrams – Basic

Resolving

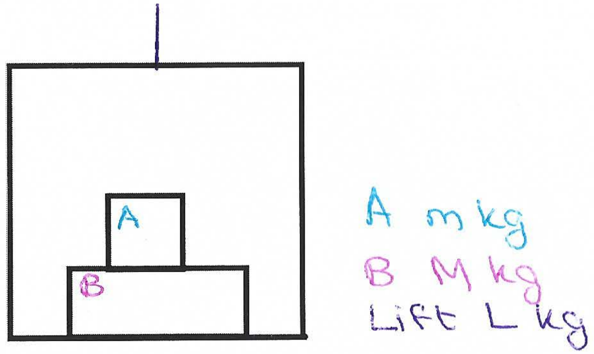


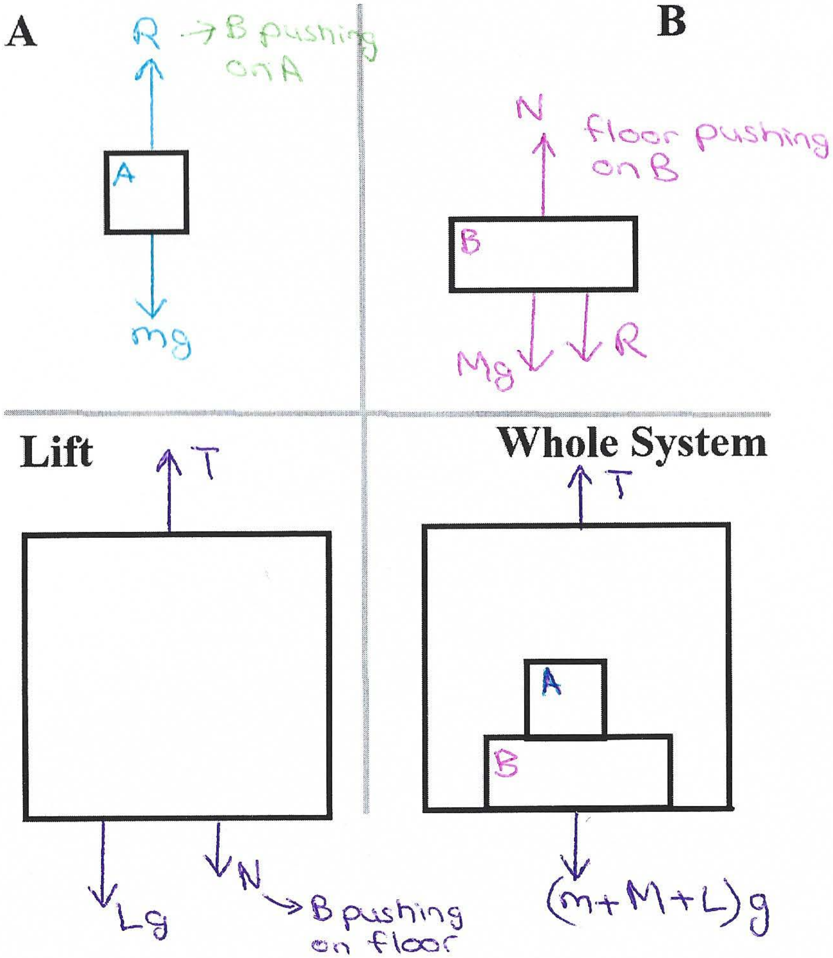
Tension

Thrust



Basics in Boxes/Lifts

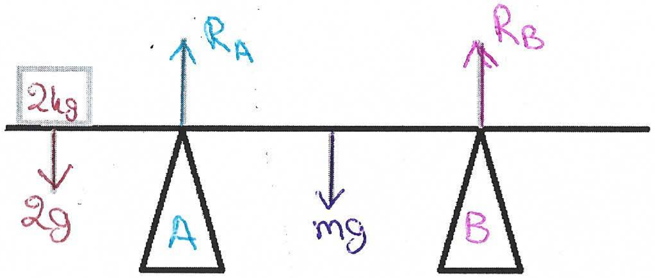




Forces

Rigid Bodies

Uniform: Weight acts at the centre
Non-uniform: Weight doesn't act on the centre
On the point of tilting about A: $R_B = 0$

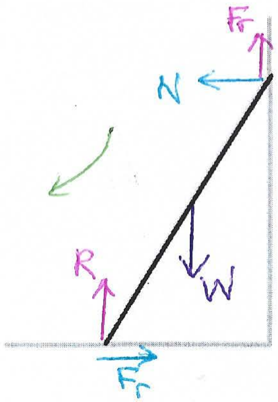


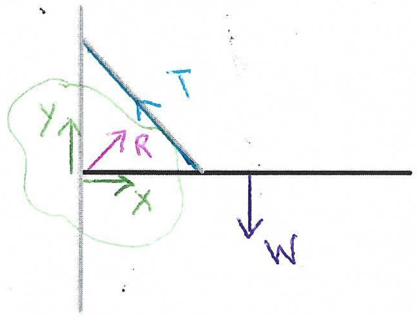
Moments

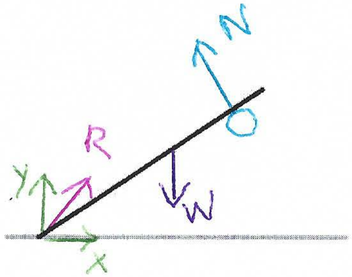
Moment = Force × Perpendicular Distance

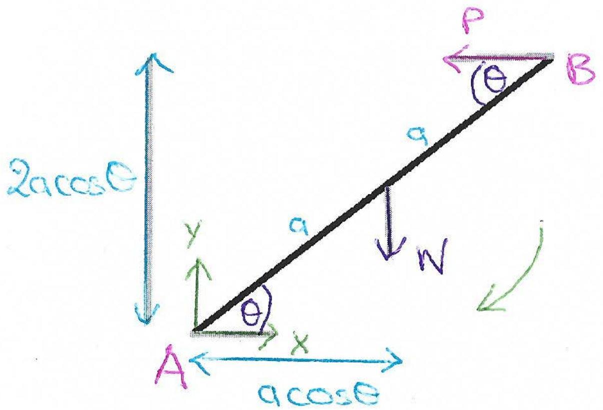
Moment = Perpendicular force × Distance
(Irtiza prefers this one)

Anticlockwise moment = Clockwise moment
(if in equilibrium)









Method:

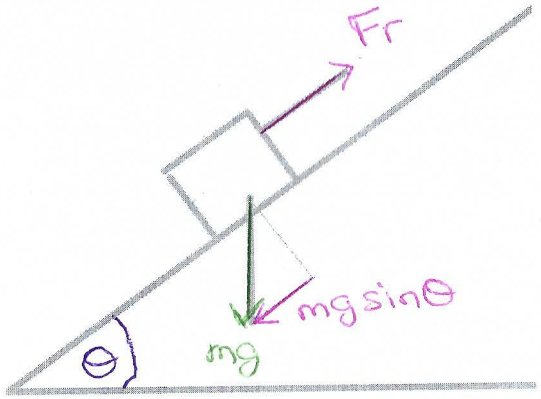
1. Resolve ⇅ up/down $Y = W$
2. Resolve ⇆ left/right $X = P$
3. Moments about A, $a\cos\theta \times W = 2a\sin\theta \times P$

Note: there are no X and Y forces in this equation as you took moments about A
(The X and Y forces were acting about A).
Whenever possible, take moments about a point that eliminates an unknown force.

Friction

- Always opposes the direction of motion/it is about to move in
- If static, $F_r \leq \mu R$
- $0 \leq \mu < 4$ ish

On slopes:

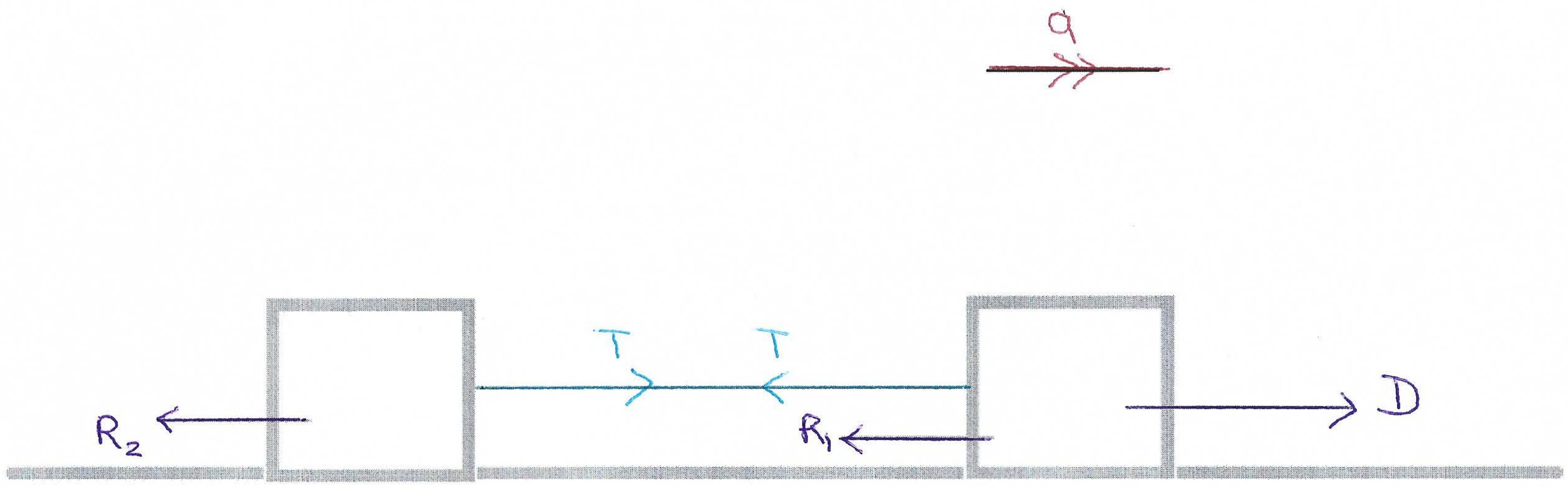


Assuming that weight is the only force acting on the object, otherwise you will have to resolve parallel to the slope then compare the resultant force against $F_{\max}$

$mg \sin\theta > F_{\max}$, it will move down

$mg \sin\theta \leq F_{\max}$, it will remain at rest

Connected Particles



Method

1. $F = ma$ On object 1
2. $F = ma$ On object 2
3. Simultaneous equations
4. SUVAT, find v, this is the value of u for when the string breaks/the particle hits the pulley
5. New acceleration, $T = 0$ (Tension, not time)
6. More SUVAT, use new a (from step 5) and u (from step 4)

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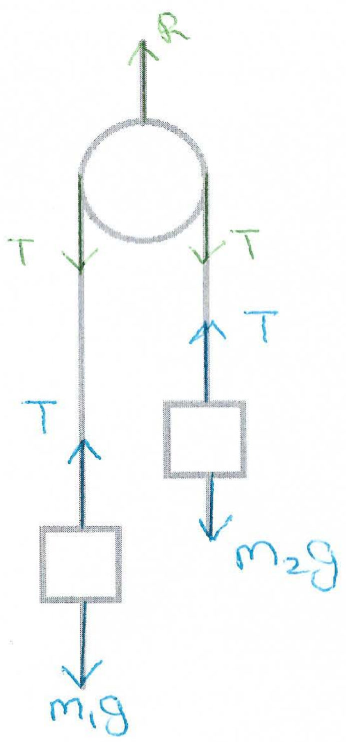

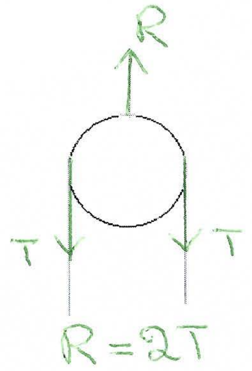

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