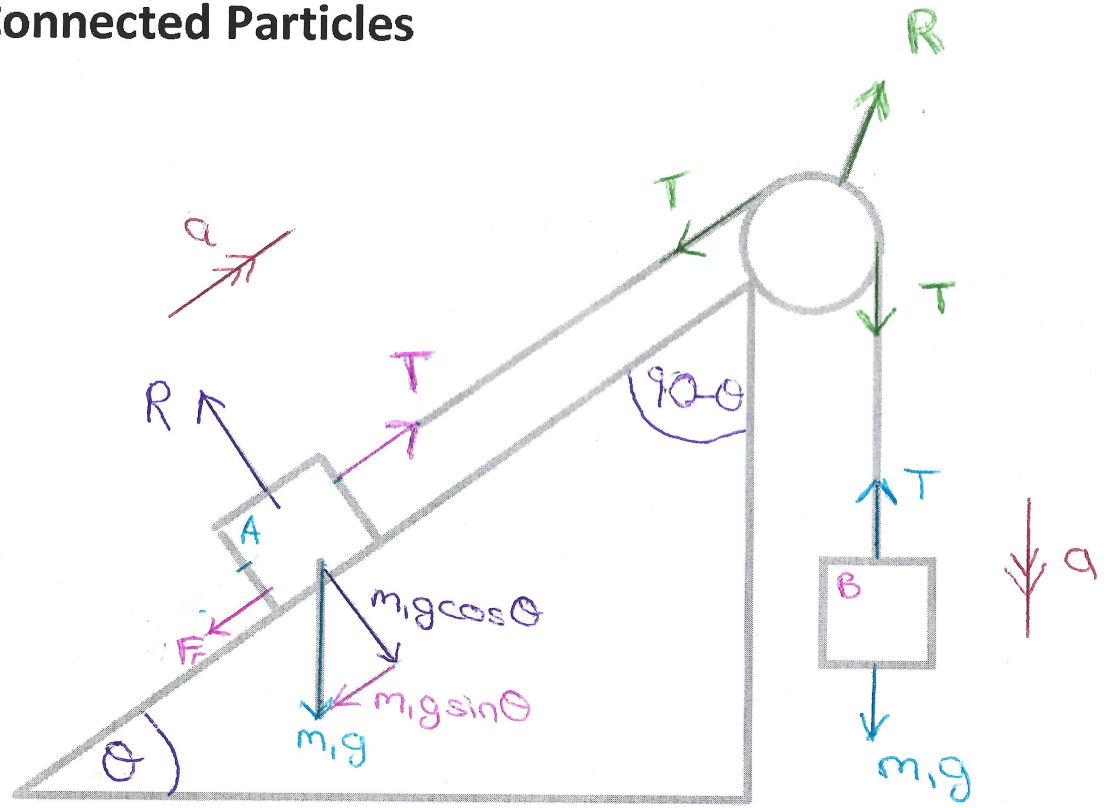
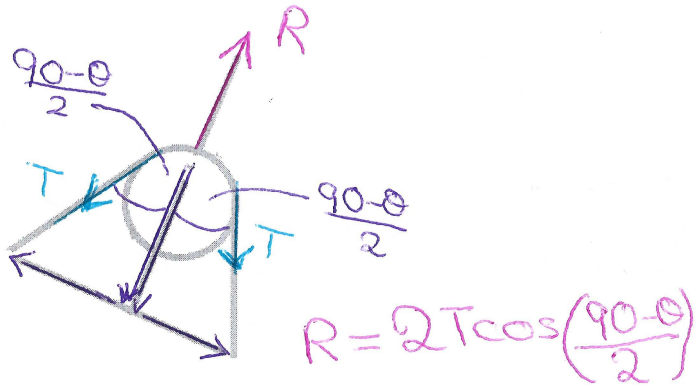
Connected Particles





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)

Modelling Assumptions

Smooth Pulley: Tension on either side of the pulley is equal

Light string: Tension is equal throughout the string

Inextensible string: Both particles have the same acceleration

Particle: Ignore air resistance, ignore rotational effects

Rod: rigid (so it doesn't bend), it has no thickness

More definitions on page 121 and 123 of the Pearson Active Learn Year 1 Stats/Mechanics text book

Equilibrium

- Static/At rest
- On the point of slipping/Limiting equilibrium
- Constant speed
- Forces are balanced

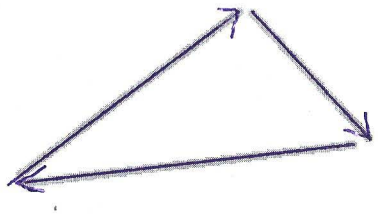
Forces are balanced

$\leftarrow = \rightarrow$

$\uparrow = \downarrow$

Vector Forces

$F_1 + F_2 + F_3 = 0$



Dynamics, $F = ma$

- If none of the above, it is accelerating/decelerating
- Resolve using $F = m\,a$ in the direction of motion
- Vectors, use $F = ma$ where F is the resultant force, $\underline{R}$

$$R = F_1 + F_2 + F_3$$