
Week 7



TAM 210/211 Introduction of Statics

DISCUSSION SESSION



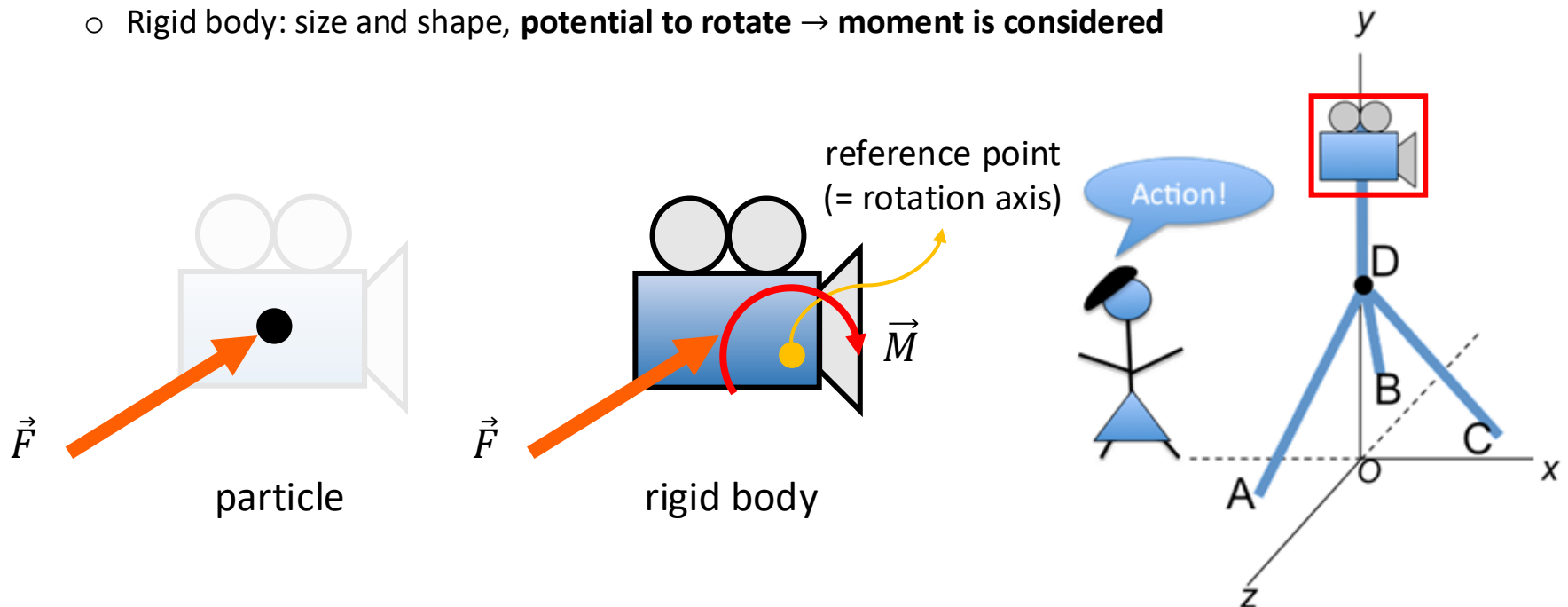
WEEK 7 – Rigid Body Equilibrium

- **Rigid body**

- An **idealized** object whose shape and size remain constant
- The distance between any two points on a rigid body always fixed (**no deformation assumed**)

- **Rigid body vs. particle?**

- Particle: no size, no dimensions, **no potential to rotate → moment isn't considered**
- Rigid body: size and shape, **potential to rotate → moment is considered**



WEEK 7 – Rigid Body Equilibrium

- **Rigid body equilibrium vs. particle equilibrium**

Particle	Rigid body
- No size and no dimensions - No potential to rotate - Particle equilibrium - Consider forces - Not consider moments	- Size and shape - Potential to rotate - Rigid body equilibrium - Consider forces - Consider moments
$\sum \vec{F} = 0$	$\sum \vec{F} = 0$ $\sum \vec{M} = 0$

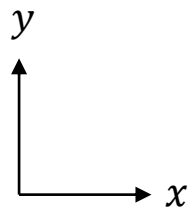
- **How to solve rigid body equilibrium problems**

1. Draw free body diagram → how to handle unknown angles, and directions?
2. Set up the equilibrium equations → $\sum \vec{F} = 0$ & $\sum \vec{M} = 0$
3. Solve the system of equations

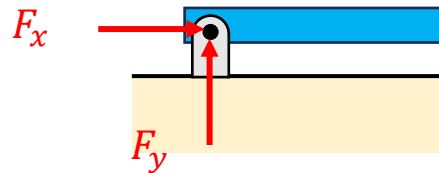
WEEK 7 – Rigid Body Equilibrium

- **Support reaction**

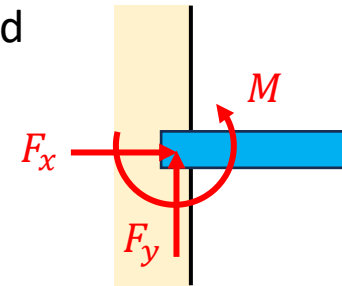
- Different by types of support/connection
- More information → reference pages on course website:
https://www.mechref.org/sta/reaction_forces/?origin=coursemenu



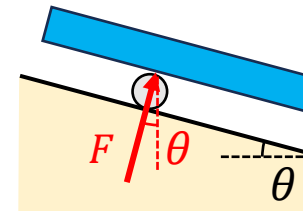
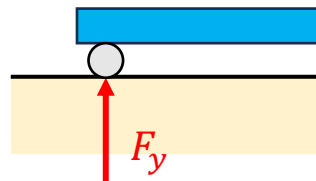
pin/hinge



fixed



roller



WEEK 7 – Rigid Body Equilibrium

- **Reaction force**

- Newton's third law – *“if two bodies exert forces on each other, these forces have the same magnitude but opposite directions”*

