Panel 1

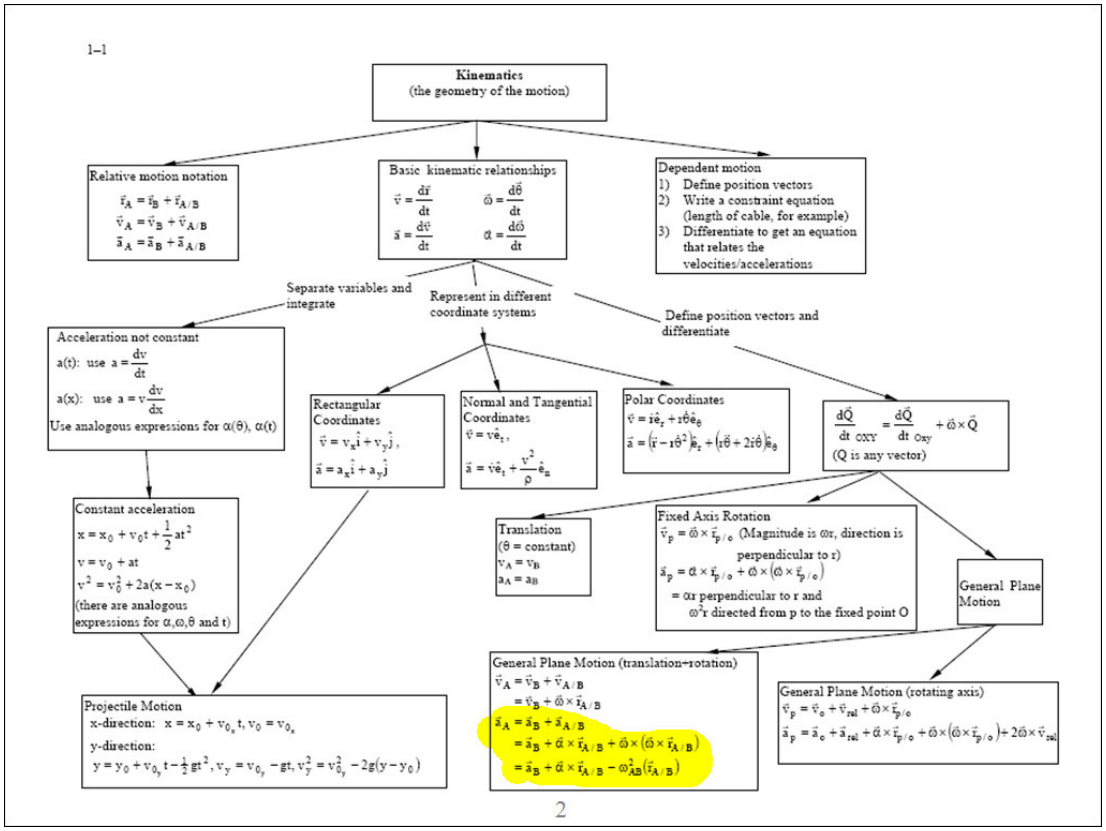
ES204 Mechanical Systems

General Plane Motion
Momentum Rate
Lecture 22

Dr. Fisher

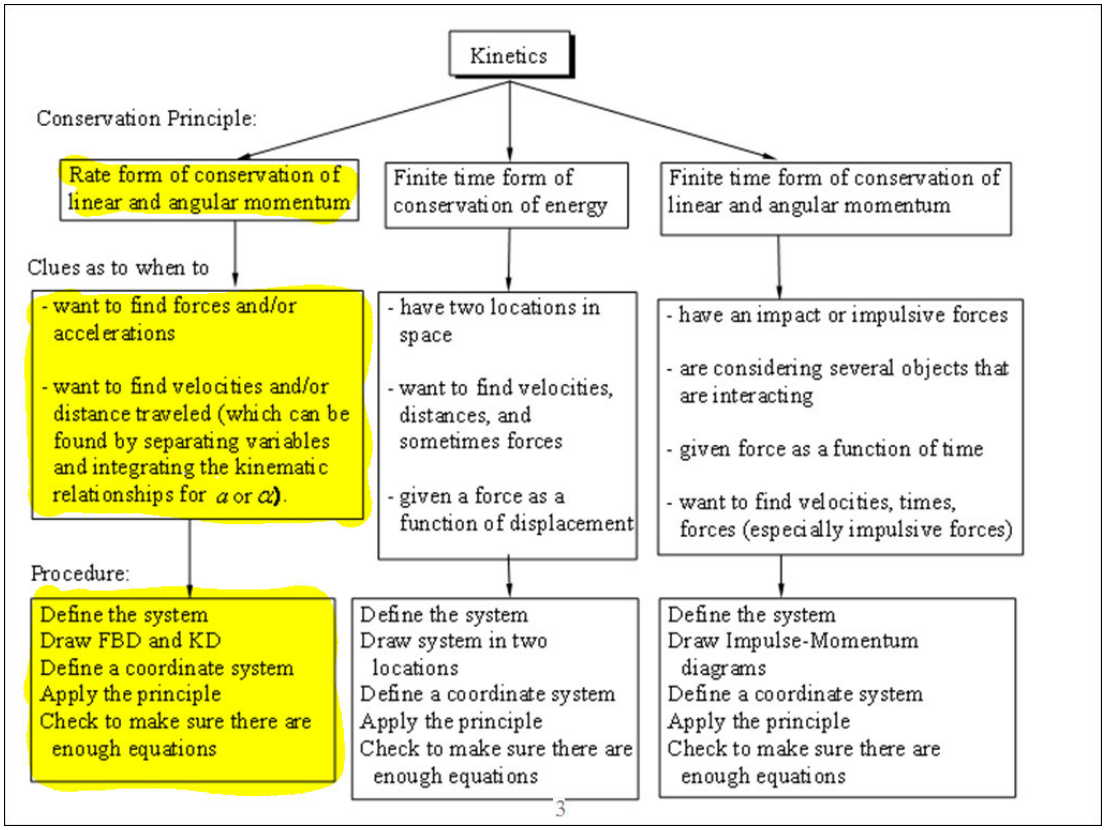
1

Panel 2

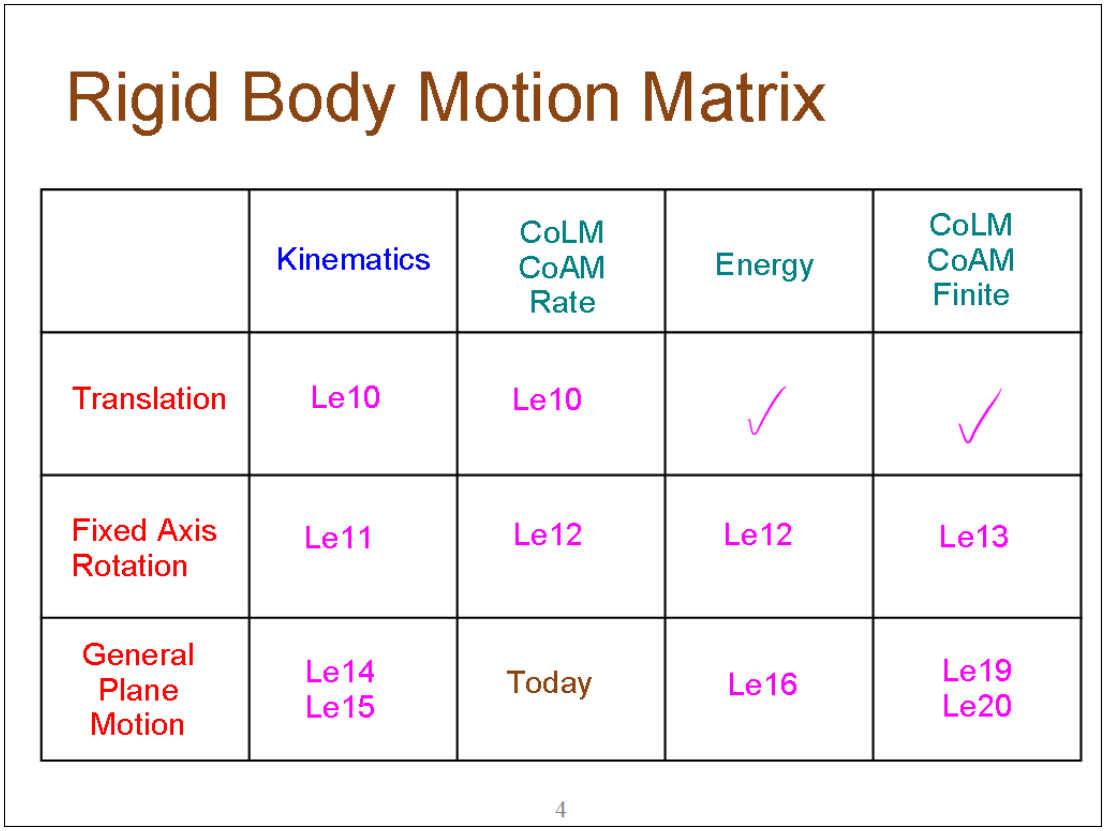


2

Panel 3



Panel 4

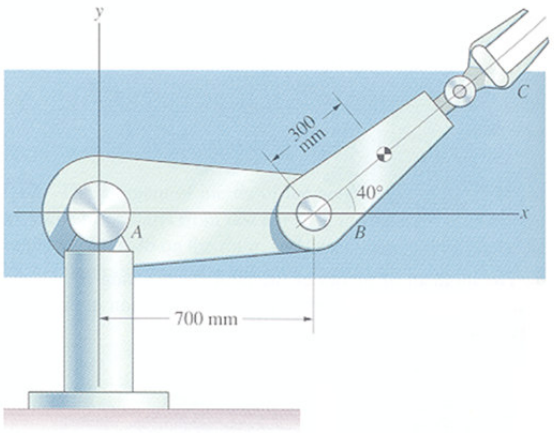


Panel 5

Arm BC has a mass of 12 kg and the mass moment of inertia about its center of mass is 3 kg-m^2. If arm AB has a constant clockwise angular velocity of 2 rad/s and arm BC has a counterclockwise angular velocity of 2 rad/s and a clockwise angular acceleration of 4 rad/s^2,
determine:

a) the couple exerted on arm BC at B,
b) the reaction at B

(*taken from Dynamics, 2nd Edition by Bedford & Fowler*)



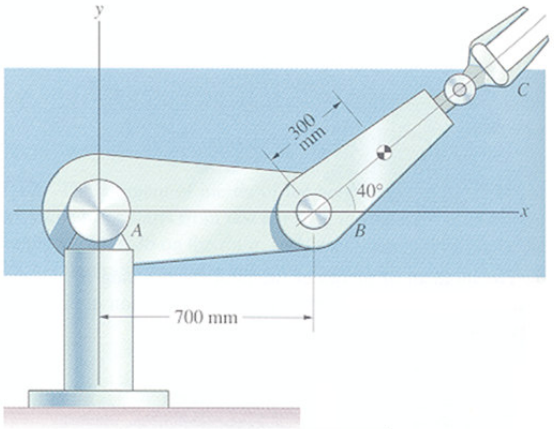
5

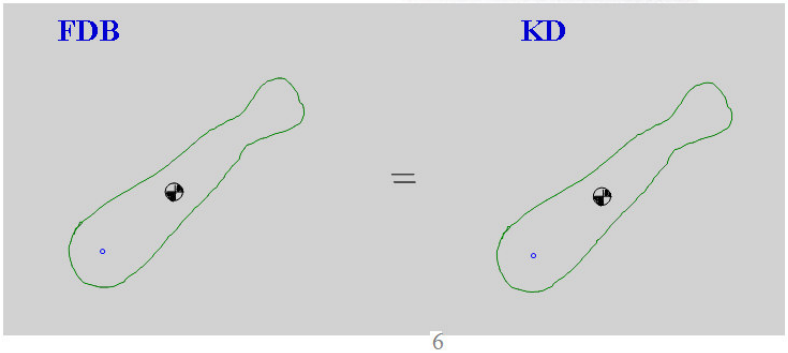
Panel 6

Arm BC has a mass of 12 kg and the mass moment of inertia about its center of mass is 3 kg-m^2. If arm AB has a constant clockwise angular velocity of 2 rad/s and arm BC has a counterclockwise angular velocity of 2 rad/s and a clockwise angular acceleration of 4 rad/s^2,
determine:

a) the couple exerted on arm BC at B,
b) the reaction at B

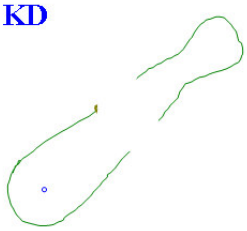
(*taken from Dynamics, 2nd Edition by Bedford & Fowler*)

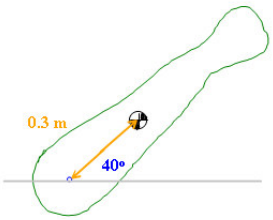




6

Panel 7





CoAM Rate about B

CoLM Rate in the x

CoLM Rate in the y

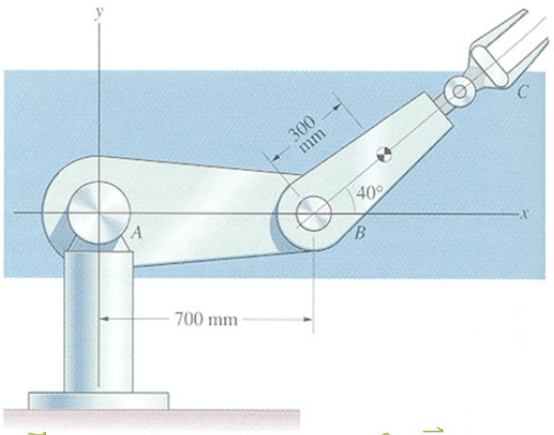
7

Panel 8

Arm BC has a mass of 12 kg and the mass moment of inertia about its center of mass is 3 kg-m^2. If arm AB has a constant clockwise angular velocity of 2 rad/s and arm BC has a counterclockwise angular velocity of 2 rad/s and a clockwise angular acceleration of 4 rad/s^2,
determine:

a) the couple exerted on arm BC at B,
b) the reaction at B

(*taken from Dynamics, 2nd Edition by Bedford & Fowler*)



$\vec{a}_B = \vec{a}_A + \vec{\alpha}_{AB} \times \vec{r}_{B/A} - \omega_{AB}^2 \vec{r}_{B/A}$

$\vec{a}_{cg} = \vec{a}_B + \vec{\alpha}_{BC} \times \vec{r}_{cg/B} - \omega_{BC}^2 \vec{r}_{cg/B}$

$\vec{a}_A =$

$\vec{\alpha}_{AB} =$

$\vec{r}_{B/A} =$

$\omega_{AB} =$

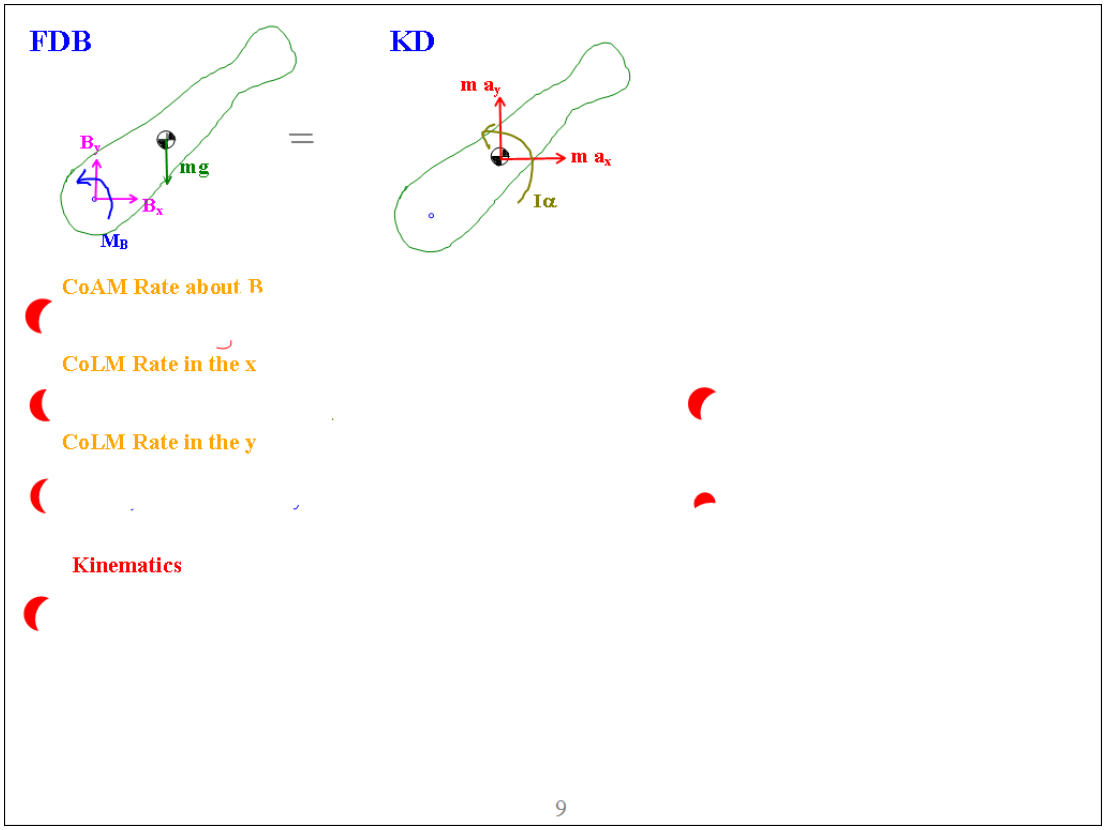
$\vec{\alpha}_{BC} =$

$\vec{r}_{cg/B} =$

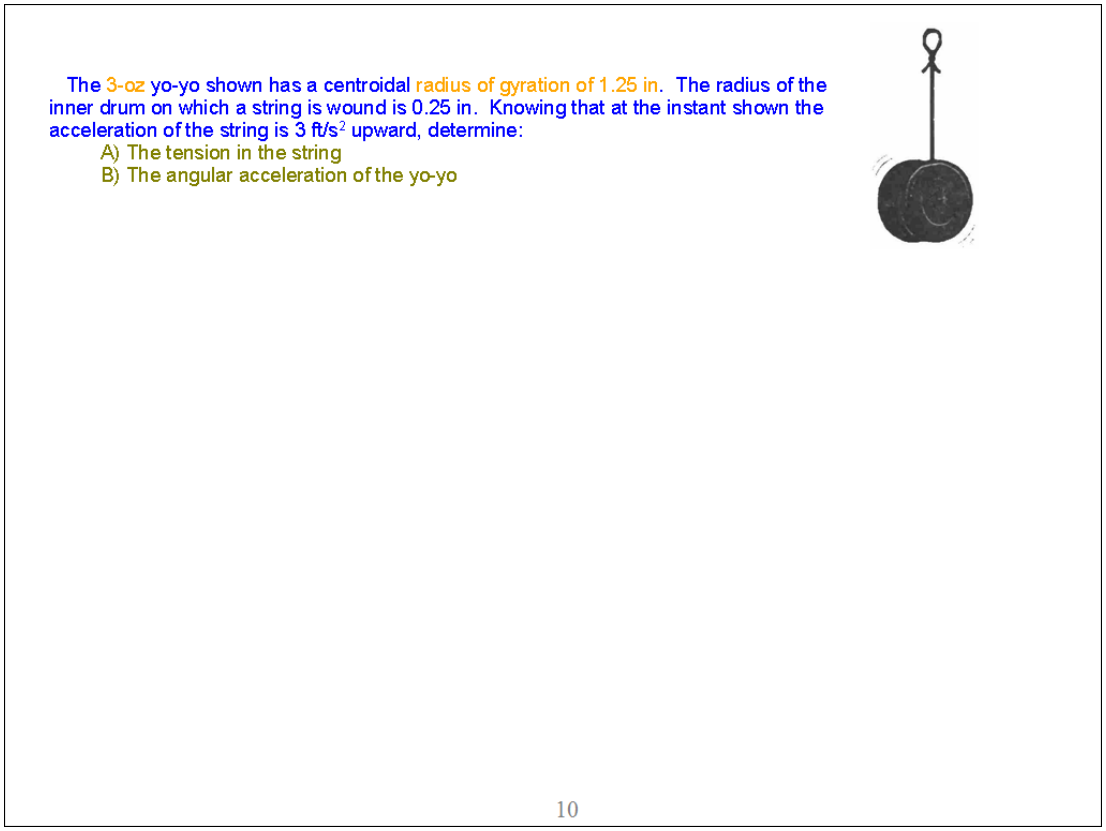
$\omega_{BC} =$

8

Panel 9



Panel 10

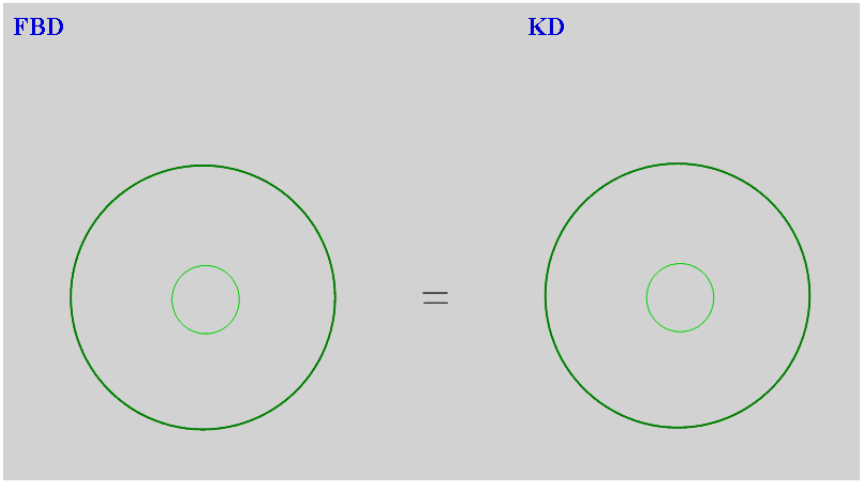


Panel 11

The 3-oz yo-yo shown has a centroidal radius of gyration of 1.25 in. The radius of the inner drum on which a string is wound is 0.25 in. Knowing that at the instant shown the acceleration of the string is 3 ft/s^2 upward, determine:

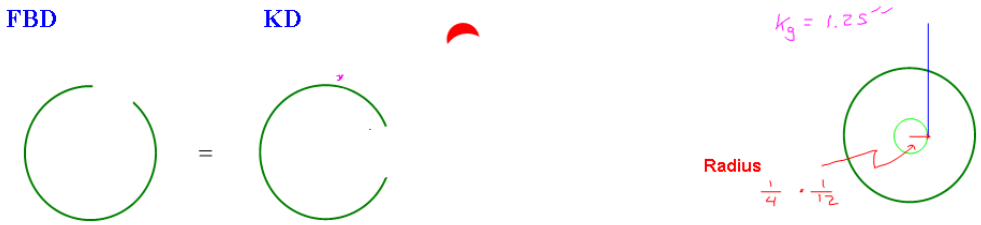
A) The tension in the string

B) The angular acceleration of the yo-yo



11

Panel 12



CoAM Rate about cg

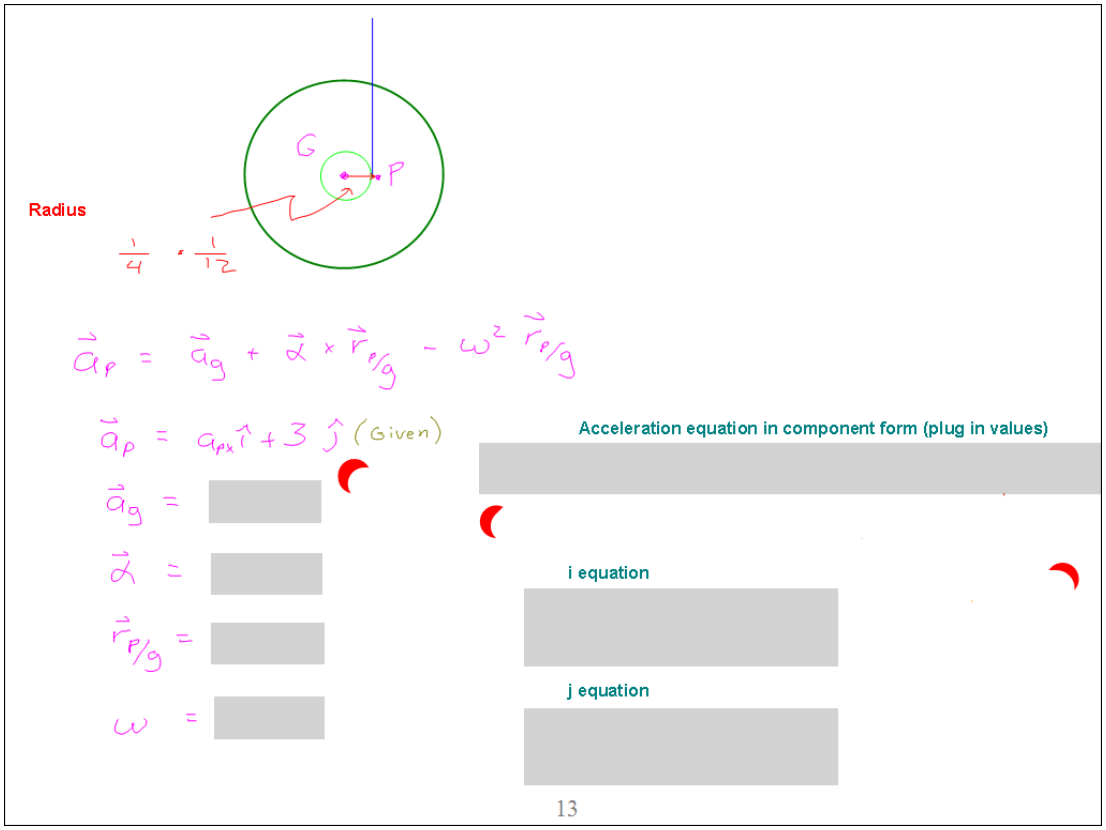
CoLM Rate in the x

CoLM Rate in the y

Mass Moment of Inertia

12

Panel 13



Panel 14