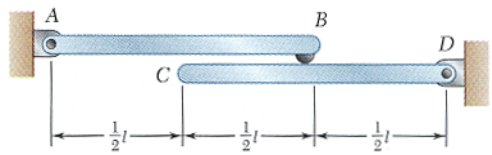


Problem 16.162

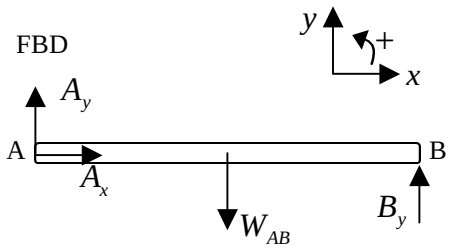
Two slender rods of length l and mass m, are released from rest in the positions shown. Knowing that a small knob at end B of rod AB bears on rod CD, determine immediately after release

a) the acceleration of end C of the rod CD
b) the force exerted on the knob

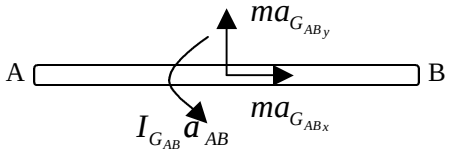
Step 1 : **Identify System**: *Both Rods*
Step 2 : **Identify Form of Equations Required**: *need acceleration and force, therefore use Rate Form*
Step 3 : **Draw system diagrams** according to choice of equation form **and identify unknowns** : *FBD and KD*

Rod AB

FBD



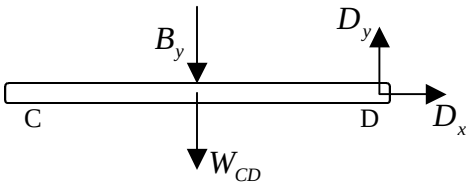
KD



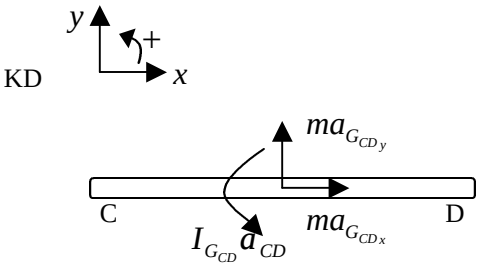
unk | eqs

Rod BC

FBD



KD



Step 4 : **Kinetics**

Rod AB

COLM(RF) in x-dir $$A_x = ma_{G_{AB_x}} \quad (1)$$

COLM(RF) in y-dir $$A_y + B_y - W_{AB} = ma_{G_{AB_y}} \quad (2)$$

COAM(RF) about point G $$-A_y \frac{l}{2} + B_y \frac{l}{2} = I_{G_{AB}} \alpha_{AB} \quad (3)$$

Rod CD

COLM(RF) in x-dir $$D_x = ma_{G_{CD_x}} \quad (4)$$

COLM(RF) in y-dir $$D_y - B_y - W_{CD} = ma_{G_{CD_y}} \quad (5)$$

COAM(RF) about point G $$D_y \frac{l}{2} = I_{G_{CD}} \alpha_{CD} \quad (6)$$