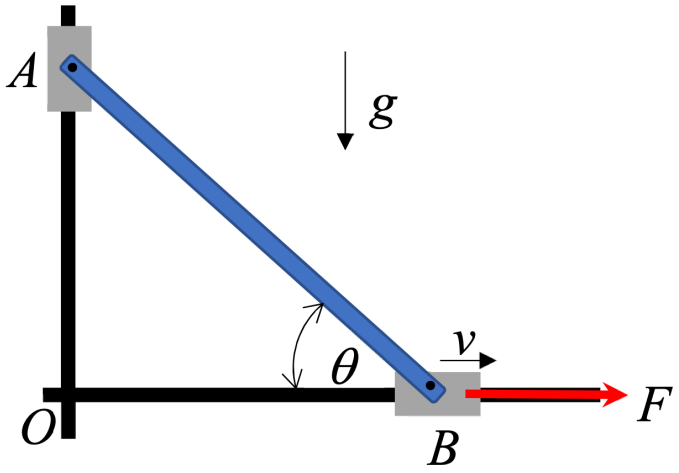
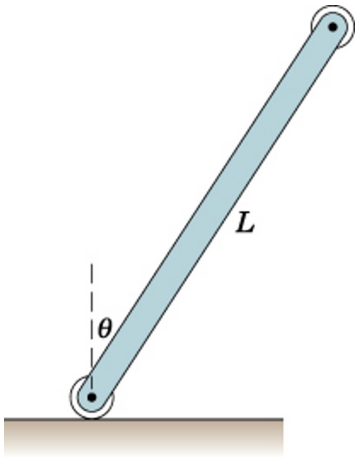
ESO209A: Dynamics: **Tutorial 9**
(Week: 29 Sep. - 5 Oct. Based on L13-L16)

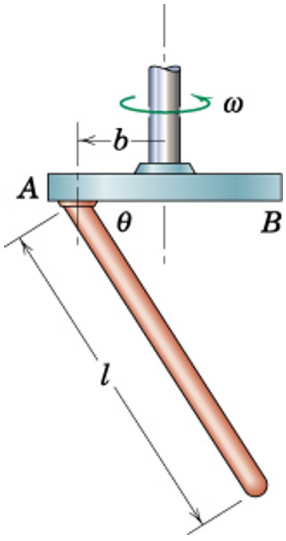
(1) Link AB moves in the vertical plane with its ends connected to collars which move frictionlessly in two perpendicular guide rods, OA and OB as shown. End B of the link moves with a constant velocity v under the action of a horizontal force F. The length of AB is l and has the mass m. Determine F as a function of θ. The gravity acts vertically downwards as shown.



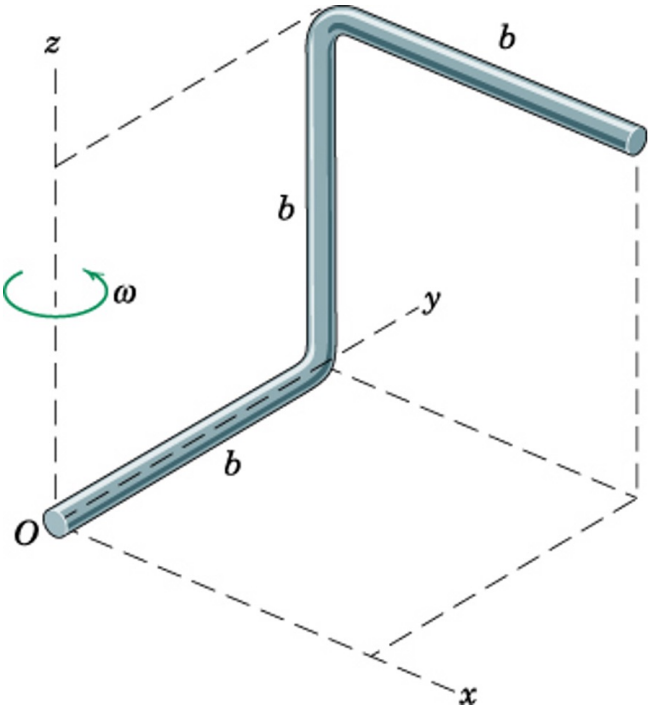
(2) A uniform rod of length l and mass m is released from the rest in the position as shown. At the time of the release the small roller at the bottom end of the rod is in contact with the ground. Determine the normal reaction and the angular acceleration immediately after the rod is released. The gravity acts vertically downward.



(3) A uniform slender rod is welded to a rotating disc as shown. For $\theta = 60°$ and $b = l/4$ determine the value of θ such that the welded joint experiences a zero moment.



(4) A bent rod as shown in figure has the linear mass density of 1 kg/m. The rod is rotating about z -axis at the constant angular velocity of $\omega = 1$ rad/sec. For $b = 1$ m determine the angular momentum about O in the frame O-xyz. Also determine the kinetic energy of the rod.



(5) The double wheel of mass m and radius of gyration r_g about O is connected to the spring of stiffness k by a cord which is wrapped securely around the inner hub. If the wheel is released from rest on the incline with the spring stretched by $9R/8$, calculate the maximum velocity v of its center O during the ensuing motion. The wheel rolls without slipping.