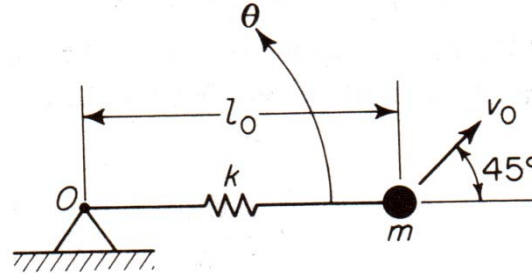


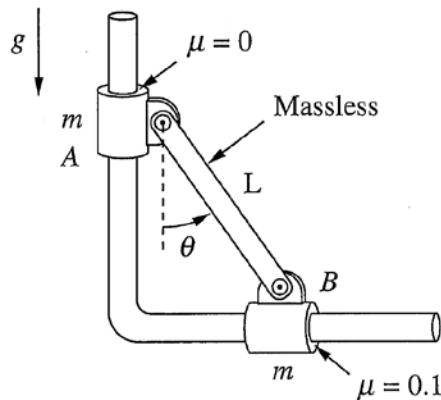
**ME EN 534**  
**Homework #4**

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1. Initially the spring is at its unstretched length  $l_o$  and the particle has a velocity  $v_o$  in the direction shown. In the motion that follows, the spring stretches to a maximum length  $4l_o/3$ . Assuming no gravity, solve for the spring stiffness  $k$  in terms of  $m$ ,  $l_o$ , and  $v_o$ .



2. Find the equation of motion for the system shown below. The equation of motion should be in terms of  $\theta$ . Each slider has mass  $m$  and the link is massless. Friction only affects the slider that moves horizontally. Use Newton's 2<sup>nd</sup> law.



3. Particles  $m_1 = 2m$  and  $m_2 = m$  can slide without friction on parallel fixed horizontal wires separated by a distance  $h$ . A spring of stiffness  $k$  and unstressed length  $h$  connects the two particles. If  $m_1$  has an initial velocity  $v_o$ ,  $m_2$  is initially motionless, and the spring is initially unstressed, find:
- The maximum velocity  $v_2$  of  $m_2$
  - The maximum stretch in the spring