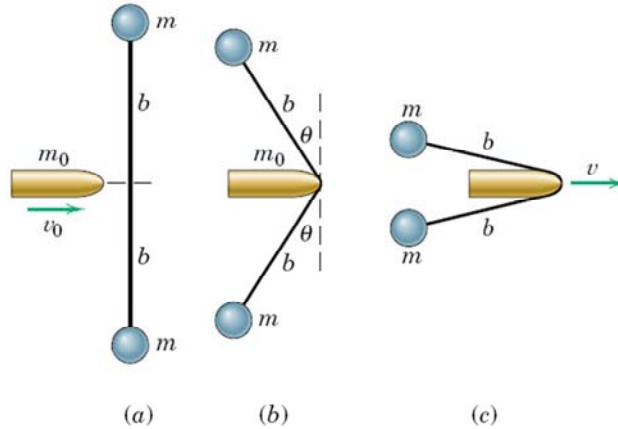


**Work-Energy:
Exercise 1**

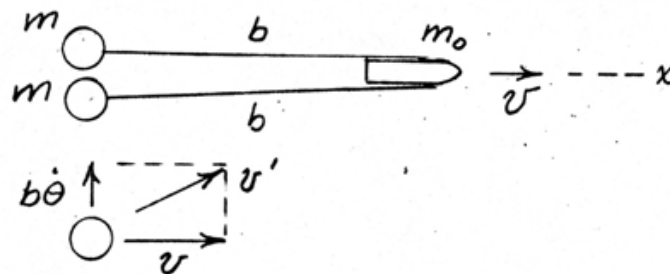


Two spheres connected by a cord are initially at rest on a horizontal surface and a projectile hits the middle of the cord.

Determine the **velocity v** when θ approaches **90°** .

ME 231: Dynamics

4/28



For system $\Delta G_x = 0: (m_0 v + 2m v) - m_0 v_0 = 0$

$$v = \frac{m_0}{m_0 + 2m} v_0$$

$U = \Delta T: 0 = \frac{1}{2} m_0 v^2 + 2 \left[\frac{1}{2} m (v^2 + b^2 \dot{\theta}^2) \right] - \frac{1}{2} m_0 v_0^2$

$$(m_0 + 2m) v^2 + 2m b^2 \dot{\theta}^2 = m_0 v_0^2$$

Substitute v & get $\frac{m_0^2 v_0^2}{m_0 + 2m} + 2m b^2 \dot{\theta}^2 = m_0 v_0^2$

Solve for $\dot{\theta}$ & get

$$\dot{\theta} = \frac{v_0}{b} \sqrt{\frac{m_0}{m_0 + 2m}}$$