	Physics 240: UnQuiz05	Name:_____

A mass m1 slides down an inclined plane through a height h (the plane is frictionless). It strikes and sticks to a mass m2. Mass m2 is connected to a massless bar of length b which is pivoted on the other end with frictionless bearings. After the collision, both masses circulate around.

(a) What is the tangential velocity right after the collision?

(b) What is the centripetal acceleration after the collision?

(c) What is the kinetic energy right after the collision?

(d) if m1=1 kg and m2=3 kg, b=1 m, and h=1m, provide numerical answers with correct SI units.

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$$\Delta K_{NC}=\Delta K_c+\Delta U:\Delta K_{NC}=0:\Delta K_c=\frac{1}{2}m_1 v^2:\Delta U=-mgh$$

$$0=\frac{1}{2}m_1 v^2-m_1 gh\Rightarrow v=\sqrt{2gh}:\text{inelastic}\ \Rightarrow m_1 v_{before}=(m_1+m_2)v_{after}$$

$$v_{after}=\frac{m_1}{m_1+m_2}\sqrt{2gh}$$

$$a=\frac{v^2}{R}=\left(\frac{m_1}{m_1+m_2}\right)^2\frac{2gh}{b}$$

$$K=\frac{1}{2}(m_1+m_2)\left(\frac{m_1}{m_1+m_2}\right)(2gh)$$

$$v_{after}=\frac{1}{4}\sqrt{2x9.8x1}=1.11\,m/s$$

$$a=\frac{(1.11)^2}{1}=1.23\,m/s^2$$

$$K=\frac{1}{2}(4)(1.11)^2=2.46\,J$$