

	Physics 210: UnQuiz05	Name: _____
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A mass m_1 slides down an inclined plane through a height h (the plane is frictionless). It strikes and sticks to a mass m_2 . Mass m_2 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 $m_1=1$ kg and $m_2=3$ kg, $b=1$ m, and $h=1$ m, provide numerical answers with correct SI units.

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

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

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

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

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

$$v_{\text{after}} = \frac{1}{4} \sqrt{2 \times 9.8 \times 1} = 1.11 \text{ m/s}$$

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

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