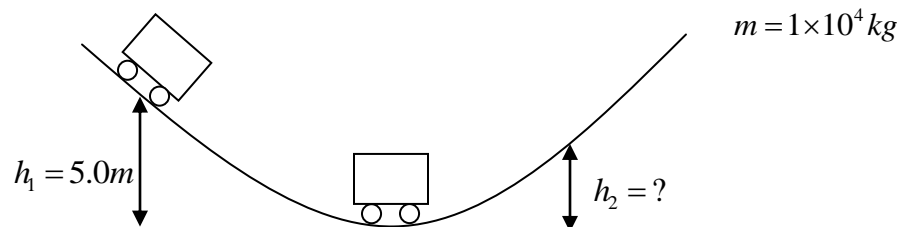


Energy & Momentum – Inelastic Collision Problems

Name: _____ Date: _____

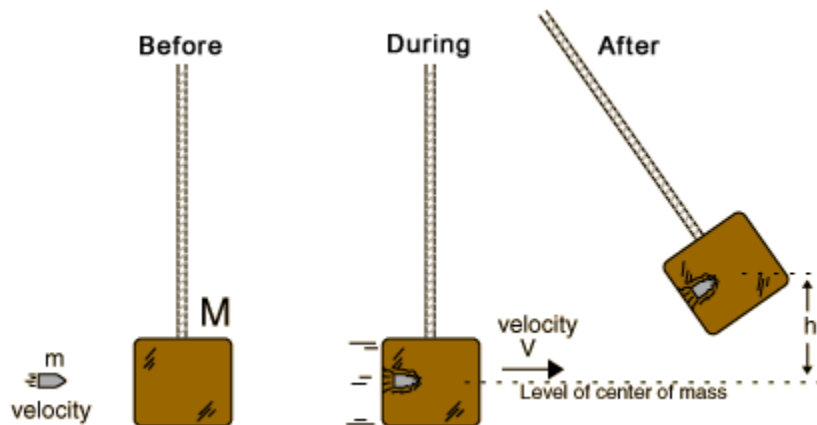
1. [5 marks] A 50kg cart rolls down a 5m high hill. It inelastically collides with a 20kg cart at the bottom. What is the combined speed of the two carts after the collision? Assume a frictionless environment and include a well labelled diagram.

2. [5 marks] Two identical railway cars shown below are initially at rest. The left car rolls downhill, collides with the stationary car, and remains coupled to it. Together they continue up the right side of the hill. Ignoring friction, how far should they rise up the hill before coming to a stop?



BALLISTIC PENDULUM – A classic physics experiment/problem

[Try problem first –
then watch this
solution video]



3. [5 marks] The ballistic pendulum can be used to determine the initial velocity of a bullet. A bullet is fired at a block with an initial speed. It hits the block and sticks inside it. The combined mass is now moving at a new slower speed. Energy is conserved and the block rises up.
- a) Determine the height reached by the block due to the impact by the bullet; initial velocity of the bullet is 500m/s . ($m = 0.05\text{kg}$ and $M = 10\text{kg}$)
- b) Determine the initial velocity of the bullet if the block and bullet combined rise to a height of 0.40m .