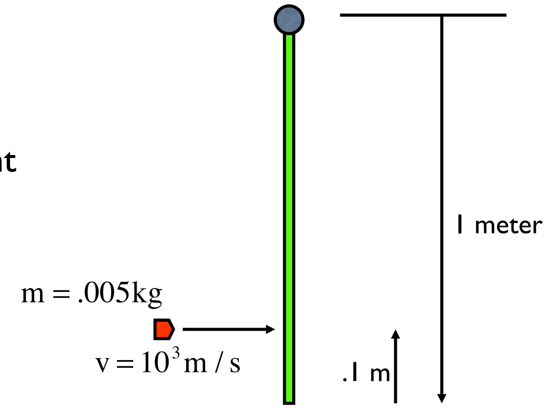
8.56.) a.) The bullet has angular momentum equal to mvd, where "d" is the distance between the bullet's strike point and the hinge. That is, it's the evaluation of rxp.

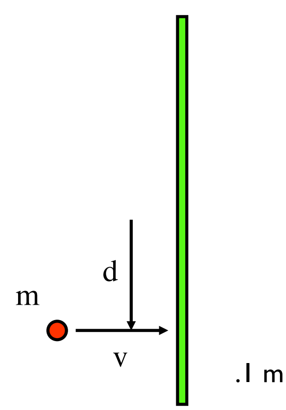


b.) Mechanical energy is never conserved through a collision unless you are told otherwise.

c.) As angular momentum is conserved, we can write:

$$\sum L_1 + \sum \Gamma_{ext} \Delta t = \sum L_2$$
$$mvd + \quad 0 \quad = m(v_{new})(d) + I_{rod}\omega$$
$$\Rightarrow mvd = m(d\omega)d + \left(\frac{1}{3}ML^2\right)\omega$$

a.) ALTERNATE PROBLEM: A meter stick that is not pinned to the frictionless table it sits on is struck by a puck a distance "d" units from the m.s.'s center. The puck sticks to the meter stick upon collision.



b.) Mechanical energy is never conserved through a collision unless you are told otherwise.

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$$\sum L_1 + \sum \Gamma_{ext} \Delta t = \sum L_2$$
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$$\Rightarrow mvd = m(d\omega)d + \left(\frac{1}{3}ML^2\right)\omega$$