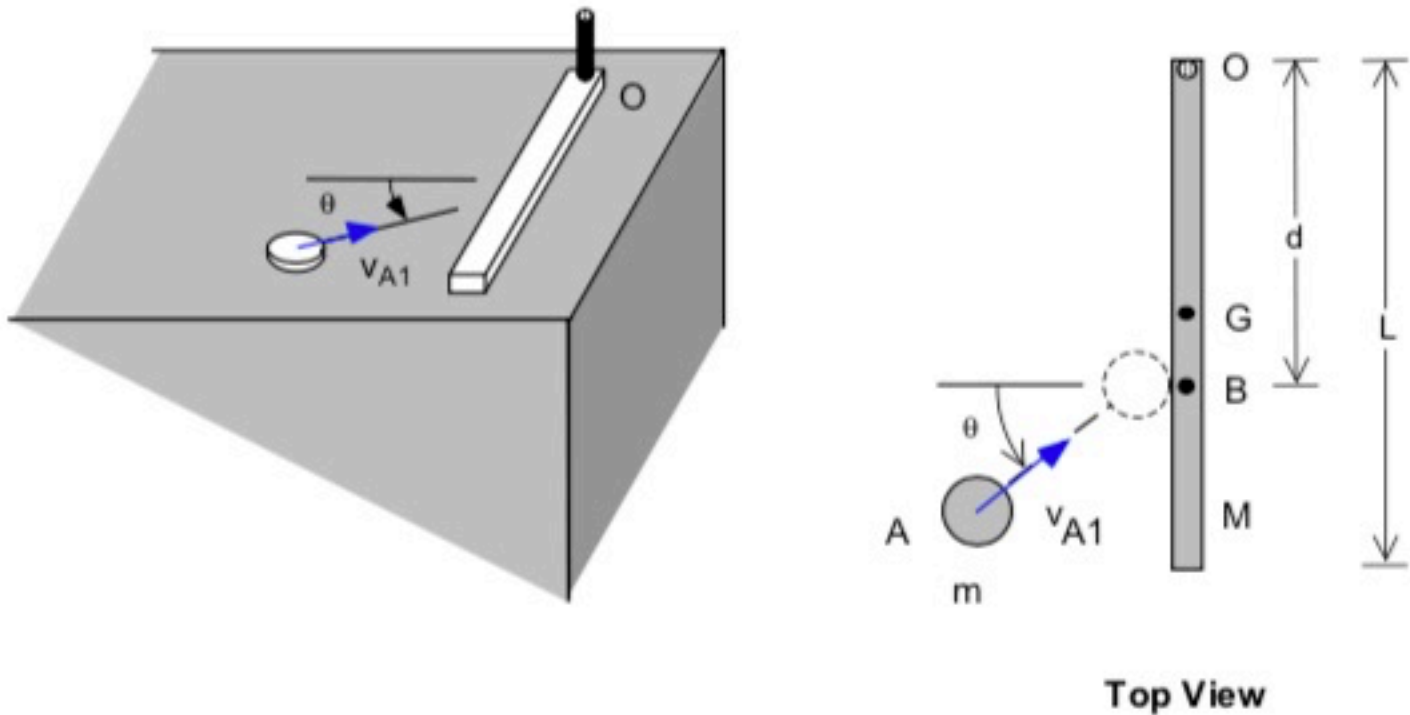


Section 5.C - bonus question #2

Given: A thin homogeneous bar having a mass of M and length of L is pinned to ground at point O in such a way that the bar can rotate about O in a horizontal plane. Puck A , with a mass of m , strikes the bar at point B (located at a distance of d from the pin at O) with a speed of v_{A1} , with A initially moving in the direction shown below. The bar is at rest before being struck by the puck. Assume that the puck sticks to the bar after impact.

Find: Determine the angular velocity of the bar after the puck strikes the bar. Assume all surfaces to be smooth. Treat the puck as a particle.



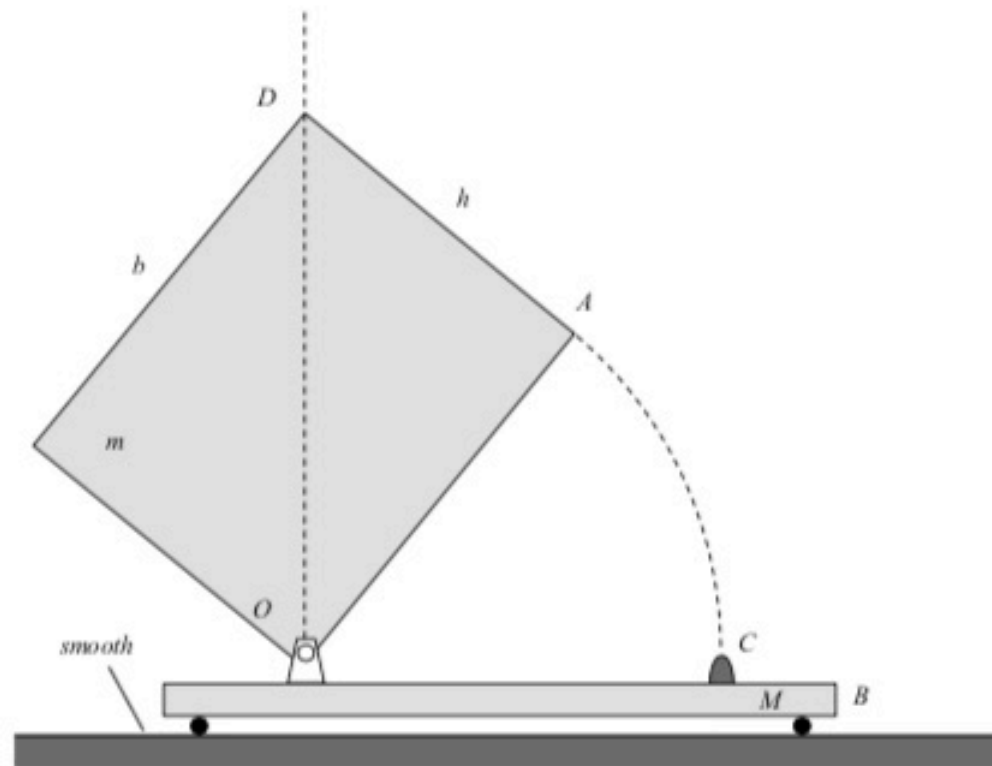
Use the following parameters in your analysis: $M = 100$ kg, $m = 50$ kg, $L = 5$ m, $d = 3$ m, $v_{A1} = 30$ m/s and $\theta = 30^\circ$.

Section 5.C - bonus problem #3

Given: A homogeneous rectangular plate of mass m is pinned to cart B at corner O, where cart B is constrained to move along a smooth horizontal surface. The system is released from rest with corner D displaced slightly to the right of a vertical line passing through the pin at O. As a result, the plate eventually impacts bumper C on the cart, with the coefficient of restitution between the plate and the bumper being e .

Find: For this problem:

- Determine the velocity of the center of mass of the plate immediately before the plate contacts the bumper C. Write your answer as a vector.
- Determine the velocity of the center of mass of the plate immediately after the plate contacts the bumper C. Write your answer as a vector.



Use the following parameters in your analysis: $m = 10$ kg, $M = 25$ kg, $b = 2$ m, $h = 1$ m and $e = 0$.