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ME 274 - Quiz09b
Spring 2026 - 11:30 class

Name SOLUTION

Question 9.3

Particles A and B are attached to a rigid bar with the bar being pinned to ground at point O. A bullet b strikes particle A and sticks. Consider a system made up of b, A, B and the rod. Circle all answers below that correctly describe this system during impact.

(a) linear momentum is conserved

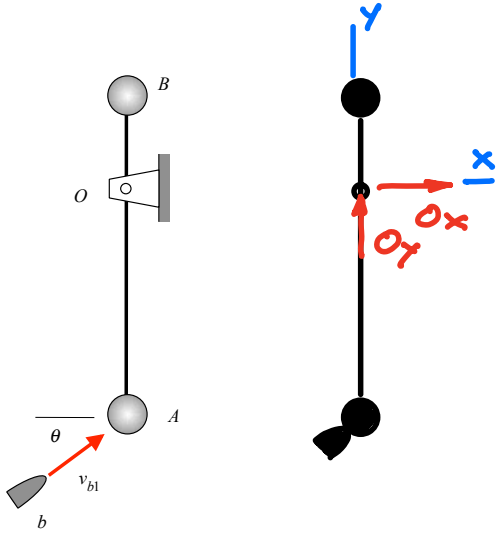
(b) angular momentum about A is conserved

(c) angular momentum about O is conserved

(d) energy is conserved

(e) none of the above

(a) $\Sigma F_x \neq 0$
$\Sigma F_y \neq 0$
(b) $\Sigma M_A \neq 0$
(c) $\Sigma M_O = 0$
(d) $e = 0$ $(e \neq 1)$



Question 9.4

In System A shown below on the left, particle P is connected to a pin joint at O with a lightweight, rigid bar of length L. Bullet b impacts the stationary particle P with a speed of v_1, and after impact the bullet sticks to P. System B is identical to System A except the rigid bar is replaced by an inextensible string of length L. Let $(v_{1,min})_A$ represent the minimum value of v_1 that is required for particle P in System A to reach position 2, a position where P is at a distance of L immediately above O. Let $(v_{1,min})_B$ represent the minimum value of v_1 that is required for P in System B to reach position 2. Circle the response below that most accurately describes the relative magnitudes of $(v_{1,min})_A$ and $(v_{1,min})_B$:

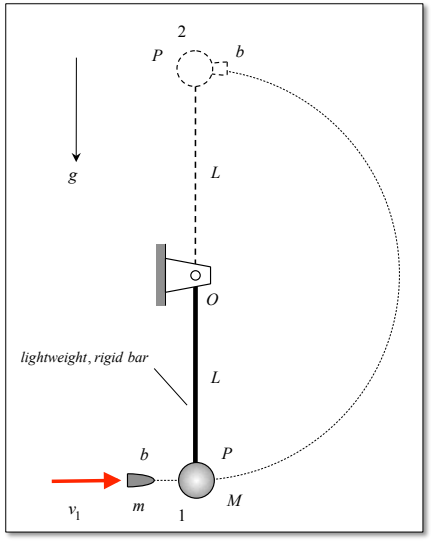
(a) $(v_{1,min})_A > (v_{1,min})_B$

(b) $(v_{1,min})_A = (v_{1,min})_B$

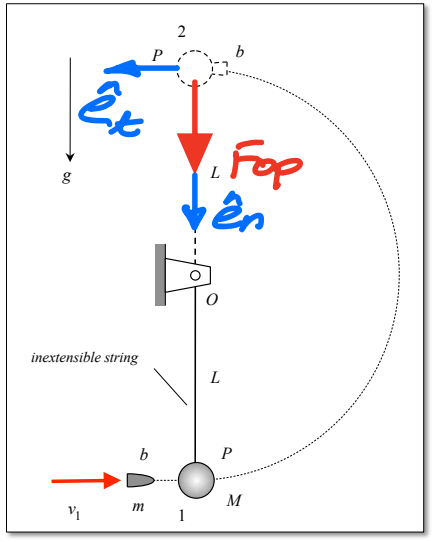
(c) $(v_{1,min})_A < (v_{1,min})_B$

Justify your response with equations and/or words.

$\Sigma F_n = F_{op} + mg = m\frac{v_2^2}{\rho}$
$\rightarrow v_{2min} = \sqrt{Lg}$



System A



System B

A: Minimum speed at top = 0

B: Minimum speed at top = $\sqrt{Lg}$