A uniform meter-stick is pivoted at point O. The meter-stick can rotate freely about O. Consider the stick held in the horizontal position. Assume it has a sufficient width.

Coin 1 is placed at $P_1$, where $\overline{OP_1} = \frac{L}{2}$.

Coin 2 is at $P_2$ where $\overline{OP_2} = L$.
The rod is released from the horizontal position at time $t = 0$.

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Are the coins expected to stay on the stick immediately after the release of the stick?

A) Coin 1 will stay-on and coin 2 will stay-on.

B) Coin 1 will detach and coin 2 will stay-on.

C) Coin 1 will stay-on and coin 2 will detach.

D) Coin 1 will detach and coin 2 will detach.

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\[
\tau = I \alpha = \frac{1}{3} m L^2 \alpha = m \frac{L}{2} g \quad \Rightarrow \quad \alpha = \frac{3}{2} \frac{g}{L}
\]

The downward acceleration of the stick at $P_1$ is $a_1 = \alpha \frac{L}{2} = \frac{3}{4} g$.

But the coin is being accelerated with a downward acceleration $g$.

So the coin is being accelerated faster than the stick.

The coin 1 will be temporarily attached itself to the stick.

At $P_2$, the downward acceleration of the stick is $a_2 = \alpha L = \frac{3}{2} g$.

The point $P_2$ on the stick is falling faster than coin 2, so coin 2 is expected to detach from the stick right away.

Answer C.

10.08-04' Coins on a Meter Stick 2004-3-24