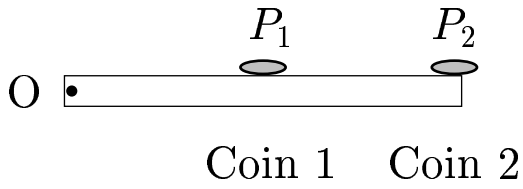
A uniform meter-stick is pivoted at point O. The meter-stick can rotate freely about O. Consider the stick held in the horizontal position. Assume it has a sufficient width.

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

Coin 2 is at P_2 where $\overline{O\,P_2} = L$.

The rod is released from the horizontal position at time $t = 0$.



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.

$$\tau = I\,\alpha = \frac{1}{3}\,m\,L^2\,\alpha = m\,\frac{L}{2}\,g \quad \Longrightarrow \quad \alpha = \frac{3}{2}\,\frac{g}{L}$$

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

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 $a_2 = \alpha\,L = \dfrac{3}{2}\,g\,.$

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