6. A pendulum consists of a bob of mass m = 0.1 kg and a massless inextensible string of length L = 1.0 m. It is suspended from a fixed point at height H = 0.9 m above a frictionless horizontal floor. Initially, the bob of the pendulum is lying on the floor at rest vertically below the point of suspension. A horizontal impulse P = 0.2 kg-m/s is imparted to the bob at some instant. After the bob slides for some distance, the string becomes taut and the bob lifts off the floor. The magnitude of the angular momentum of the pendulum about the point of suspension just before the bob lifts off is J kg-m²/s. The kinetic energy of the pendulum just after the lift-off is K Joules.
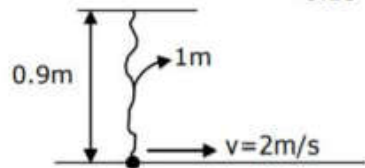
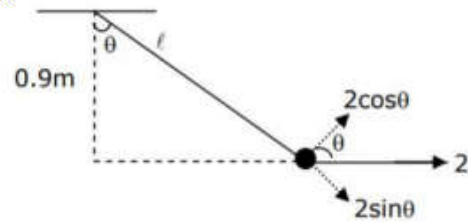The value of J is _____.

The value of K is _____.

Solution:

A.

Angular momentum = $L = mvr_\perp$

$\qquad\qquad\qquad\qquad = 0.2 \times 0.9$

$\qquad\qquad\qquad\qquad = 0.18$

B.

2sinθ will become zero
because of impulse from string

$\text{K.E.} = \dfrac{1}{2} \times 0.1 \times (2 \times 0.9)^2 \qquad = 0.16J$