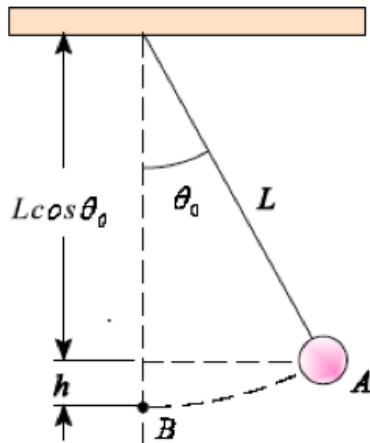


Answer on Question #49706, Physics, Mechanics | Kinematics | Dynamics

A simple pendulum consisting of a small heavy bob attached to a light string of length 40cm is released from rest with the string at 60° to the downward vertical. Find the speed of the pendulum bob as it passes through its lowest point.

Solution:



The total mechanical energy (ME) of a body, is the sum of its kinetic energy (KE) and its gravitational potential energy (PE):

$$ME = KE + PE = \text{constant}$$

Thus,

$$KE_{final} = PE_{initial}$$

$$\begin{aligned} \frac{mv^2}{2} &= mgh \\ v &= \sqrt{2gh} \\ h &= L - L\cos(\theta_0) \end{aligned}$$

Hence,

$$v = \sqrt{2gL(1 - \cos(\theta_0))} = \sqrt{2 * 9.8 * 0.4(1 - \cos(60^\circ))} = 1.98 \text{ m/s}$$

Answer: $v = 1.98 \text{ m/s}$