Physics 101Rec
Quiz#6-Sect0~~4~~
Chapter 8

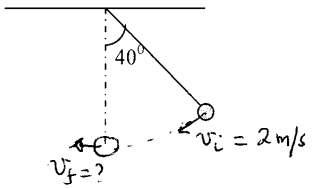
Name: Key Id:

A simple pendulum consists of a bob of mass M = 0.5 kg and a string of length L = 2.0 m. The bob is released with an initial speed of 2.0 m/s when the bob makes an angle of 40° to the vertical.

(a) What is the speed of the bob at the lowest point?

$$\Delta K + \Delta U_g = 0$$

$$\frac{1}{2} m \left(v_f^2 - v_i^2 \right) + \left(0 - mgh \right) = 0$$

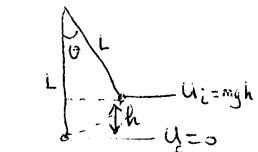


$$v_f^2 = v_i^2 + 2gh$$

$$v_f = \sqrt{v_i^2 + 2gh} = \sqrt{v_i^2 + 2gL(1-\cos\theta)}$$

$$= \sqrt{4 + 2 \times 9.8 \times 2 (1 - \cos 40^\circ)}$$

$$= \sqrt{13.2} = \boxed{3.6 \text{ m/s}}$$



$h = L - L\cos\theta$

$= L(1 - \cos\theta)$

(b) What is the speed of the bob at the lowest point is it is released from rest?

$v_i = 0$

$$v_f = \sqrt{2gL(1-\cos\theta)}$$

$$= \sqrt{9.2} = \boxed{3 \text{ m/s}}$$

as expected v_f in (b) is less than v_f in (a) !