

Physics 101- Chapter 8

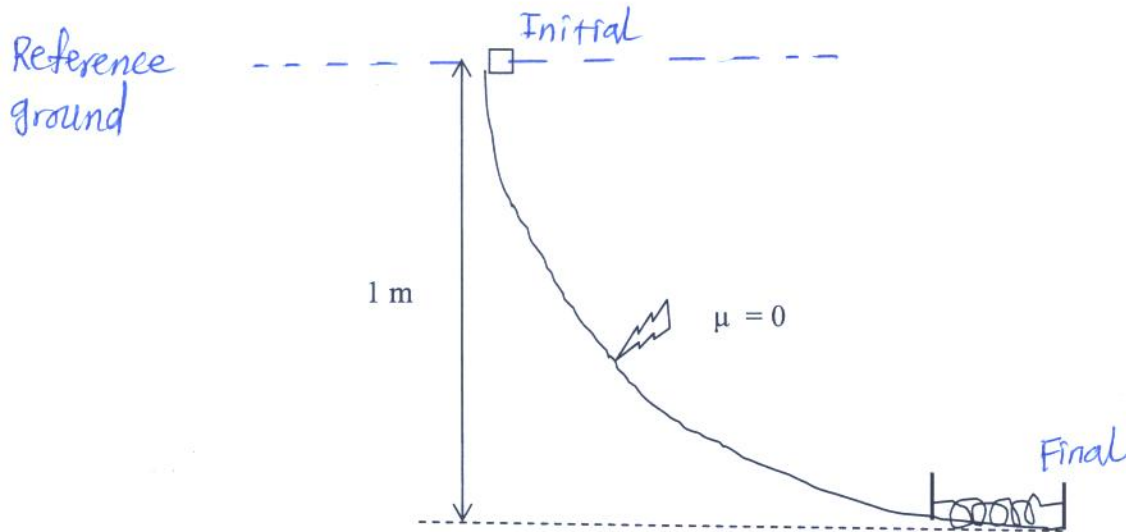
Quiz No. 5

Name: Key

ID:

Sec: 29

A block of mass 1 kg is released from rest and slides down a frictionless track of height 1 m above a table. At the bottom of the track, where the surface is horizontal, the block strikes and compresses a spring constant 400 N/m (see Fig). Find the maximum distance through which the spring is compressed.



The total energy is conserved:

$$\Delta E_{\text{sys.}} = 0 \Rightarrow \cancel{\Delta K} + \Delta U_g + \Delta U_s + \cancel{\Delta E_{\text{Th.}}} + \cancel{\Delta E_{\text{int.}}} = 0$$
$$mg(y_f - y_i) + \frac{1}{2}k(x_f^2 - x_i^2) = 0$$

$$(-1 \times 9.8 \times 1) + \frac{1}{2} \times 400 \times x_f^2 = 0$$

$$200 x_f^2 = 9.8$$

$$x_f = 0.221 \text{ m}$$

The maximum distance is = 0.221 m