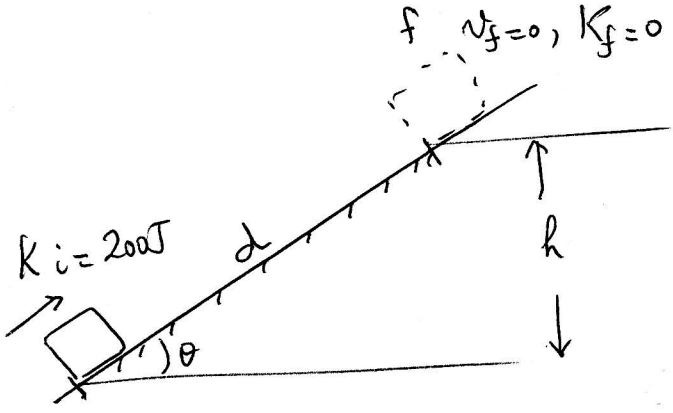
PHYS101
QUIZ#7 - CHAPTER 8
DATE: 10/11/12

Name: Key Id#: Sect#

A 3.0 kg block starts up a 40° incline with 200 J of kinetic energy. How far will it slide up the incline if the coefficient of kinetic friction between the block and the incline is 0.40?



$h = d \sin\theta$

$$\Delta K + \Delta U_g + \cancel{\Delta U_s} = W_f$$

$$\cancel{K_f} - K_i + mgh = -\mu_k (mg\cos 40^\circ)\, d$$

$$-200 + 3\times 9.8 \times d \sin 40^\circ = -0.4\times 3\times 9.8\times \cos 40^\circ\, d$$

$$d\,(3\times 9.8\times \sin 40^\circ + \underset{(0.4)}{\mu_k} 3\times 9.8\times \cos 40^\circ) = 200$$

$$d = \frac{200}{27.9} = \boxed{7.2\ m}$$

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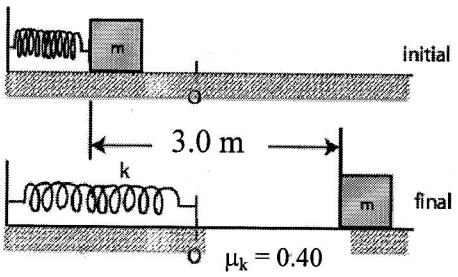
A 2.0 kg block is released from a compressed spring (k=160 N/m). It travels over a horizontal surface (μ_k =0.40) for a distance of 3.0 m before coming to rest. How far was the spring compressed before being released



$$\Delta K^{\nearrow 0} + \Delta U_s + \Delta U_g^{\nearrow 0} = W_f$$

$$\frac{1}{2} k(x_f^{\nearrow 0} - x_i^2) = -f_k d = -\mu_k mg d$$

$$-\frac{1}{2} k x_i^2 = -\mu_k mg d$$

$$x_i = \pm\sqrt{\frac{2\mu_k mg d}{k}} = -0.54\,m$$

Compression $\boxed{x = 0.54m}$

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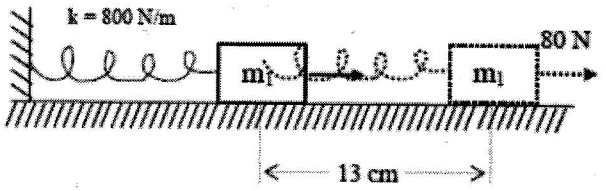
A 12-kg block is resting on a horizontal frictionless surface. The block is attached to an unstretched spring (k= 800 N/m) (see the figure). A force F = 80 N parallel to the surface is applied to the block. What is the speed of the block when it is displaced by 13 cm from its initial position?



$$\Delta K + \Delta U_g + \Delta U_s = W_f + W_{app}$$

$$K_f - K_i + \frac{1}{2}k(x_f^2 - x_i^2) = F d \qquad x_f = d = 13\text{ cm}$$

$$K_f + \frac{1}{2}k d^2 = F d$$

$$K_f = F d - \frac{1}{2}k d^2 = 80 \times 0.13 - \frac{1}{2} \times 800 \times (0.13)^2$$

$$= 3.64\text{ J}$$

$$K_f = \frac{1}{2} m v_f^2$$

$$v_f = \sqrt{\frac{2K_f}{m}} = \boxed{0.78\text{ m/s}}$$