

Physics 101Rec
Quiz#6a
Chapter 8

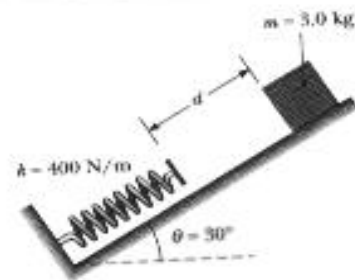
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Name:

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Sect:

A 3.0 kg mass starts from rest and slides a distance d down a frictionless 30° incline, where it contacts an unstressed spring of negligible mass as shown in the figure. The mass slides an additional distance 0.2 m as it is brought momentarily to rest by compressing the spring ($k = 400 \text{ N/m}$). Find the initial separation d between the mass and the spring.



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

$$0 + (0 - mg(d+x)\sin 30^\circ) + \left(\frac{1}{2}kx^2 - 0\right) = 0$$

$$mgd\sin 30^\circ + mgx\sin 30^\circ = \frac{1}{2}kx^2$$

$$d = \frac{\frac{1}{2}kx^2 - mgx\sin 30^\circ}{mg\sin 30^\circ} = \frac{8 - 2.94}{14.7}$$

$$d = 0.344 \text{ m}$$