Physics 101-Rec
Quiz # 6

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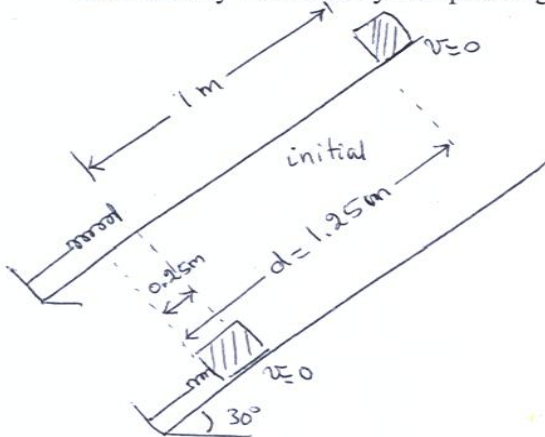
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A 2.0 kg block, starting from rest, slides a distance d = 1.0 m down a frictionless $30^0$ incline where it contacts a spring. The mass slides an additional 25 cm as it is brought momentarily from rest by compressing the spring. Find the spring constant of the spring.



$$W_{net} = \Delta K = W_g + W_s$$

$$W_g = (mg \sin\theta)d$$

$$= 2 \times 9.8 \times \sin 30^\circ \times 1.25$$

$$= 12.25 \text{ J}$$

$$W_s = \frac{1}{2}k x_i^2 - \frac{1}{2}k x_f^2 \qquad (x_i = 0)$$

$$x_f = -0.25 \text{ m}$$

$$\Rightarrow W_s = -\frac{1}{2}k(-0.25)^2 = -0.03\,k$$

$$\Delta K = K_f - K_i = 0 \qquad \text{since} \quad K_f = 0 \quad \text{and} \quad K_i = 0$$

$$\Rightarrow \quad W_g + W_s = 0 \quad \Rightarrow \quad 12.25 - 0.03\,k = 0$$

$$\Rightarrow \quad \boxed{k = 392 \text{ N/m}}$$