

Physics 101-Rec
Quiz # 7

Instructor: Dr. Mekki

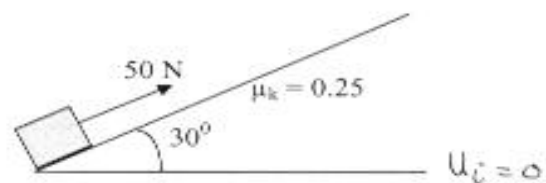
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A 2.0 kg block is pulled by a force $F = 50$ N along a rough incline as shown in the figure. The block starts from rest. Find the speed of the block when it is pulled a distance of 2.0 m up the incline.



$$\Delta K + \Delta U_g = W_{fk} + W_F$$

$$\Delta K = K_f - K_i = \frac{1}{2} m v_f^2 = \frac{1}{2} \times 2 v_f^2 = v_f^2$$

$$\Delta U_g = U_f - U_i = mgh = mg d \sin \theta = 2 \times 9.8 \times 2 \times \sin 30^\circ = 19.6 \text{ J}$$

$$W_{fk} = -\mu_k N d = -\mu_k (mg \cos \theta) d = -0.25 \times 2 \times 9.8 \times \cos 30^\circ \times 2 = -8.5 \text{ J}$$

$$W_F = F d = 50 \times 2 = 100 \text{ J}$$

$$\Rightarrow v_f^2 + 19.6 = -8.5 + 100 \Rightarrow v_f^2 = 71.9 \Rightarrow v_f = 8.5 \text{ m/s}$$