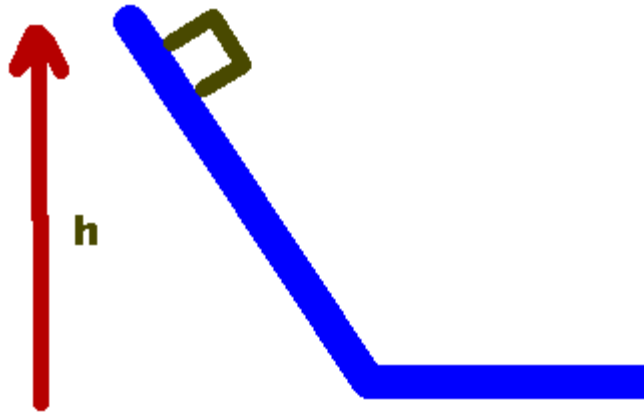


A piece of dry ice of mass m is allowed to slide down a frictionless surface, starting from rest at a height h above a table. The dry ice has a mass m .



(1) calculate the initial kinetic energy (K_i). Assume at the bottom, the dry ice moves with a velocity v . With this, calculate the final kinetic energy K_f .

(2) Assume the bottom is where $h=0$. Calculate the initial potential energy U_i and the final potential energy (U_f).

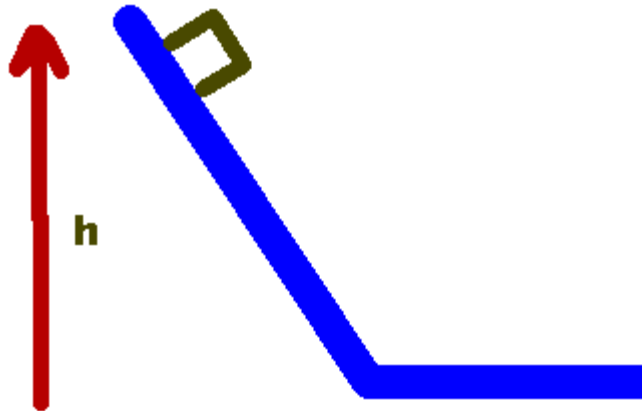
(3) Calculate ΔK and ΔU .

(4) If energy is conserved, $\Delta E=0$. Write then the change in total mechanical energy using (1) and (2) above.

$$\Delta E = \underline{\hspace{2cm}}$$

(5) Solve your result in (4) to answer the question: how fast is the mass moving at the bottom of the inclined plane?

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(1) calculate the initial kinetic energy (K_i). Assume at the bottom, the dry ice moves with a velocity v . With this, calculate the final kinetic energy K_f .

$$K_i = \frac{1}{2} m v_i^2 = 0 : K_f = \frac{1}{2} m v_f^2$$

(2) Assume the bottom is where $h=0$. Calculate the initial potential energy U_i and the final potential energy (U_f).

$$U_i = m g y_i = m g h : U_f = m g y_f = 0$$

(3) Calculate ΔK and ΔU .

$$\Delta K = K_f - K_i = \frac{1}{2} m v_f^2 : \Delta U = U_f - U_i = 0 - m g h = -m g h$$

(4) If energy is conserved, $\Delta E = 0$. Write then the change in total mechanical energy using (1) and (2) above.

$$\Delta E = 0 : \Delta E = \Delta K + \Delta U = \frac{+1}{2} m v_f^2 - m g h = 0$$

$$\Delta E = \underline{\hspace{2cm}}$$

(5) Solve your result in (4) to answer the question: how fast is the mass moving at the bottom of the inclined plane?

$$\frac{1}{2} m v_f^2 - m g h = 0 \Rightarrow \frac{1}{2} m v_f^2 = m g h \Rightarrow v_f^2 = 2 g h \Rightarrow v_f = \pm \sqrt{2 g h} : \text{physical solution: } v_f = \sqrt{2 g h}$$