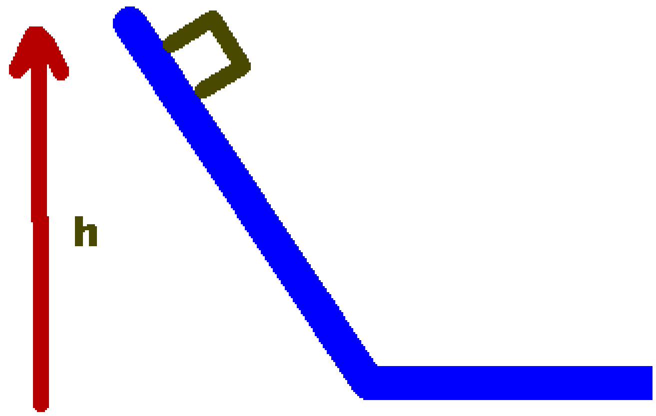
	Physics 210: UnQuiz03	Name:_______________

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.

$\Delta E=$______________

(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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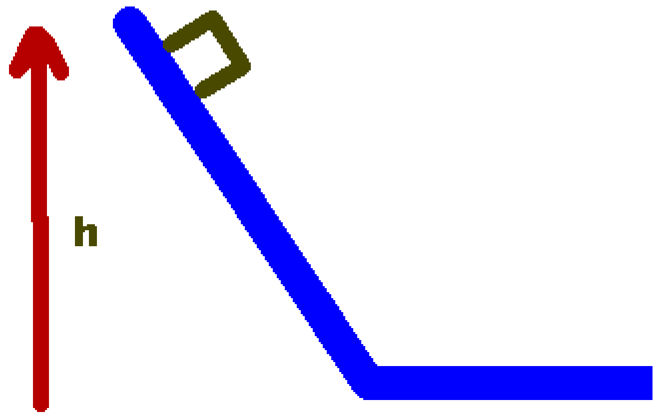

(1) calculate the initial kinetic energy (K_i). Assume at the bottom, the dry ice moves with a velocity v. With this, calculate the final kinetic energy K_f.

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

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

$$U_i=mg\,y_i=mgh : U_f=mg\,y_f=0$$

(3) Calculate ΔK and ΔU .

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

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

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

$\Delta E=$_______________

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

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