CONSERVATION OF ENERGY LAB

> In this experiment, you will use a ramp and marble to investigate the conservation of mechanical energy.

PROCEDURE

1. Clamp the ramp to a lab table and carefully measure h_1, and h_2 as shown in the diagram. Record your measurements in meters in Data Table 1 (1 m = 100 cm).
2. Place a piece of drawing paper on the floor in front of your ramp.
3. Find the mass of a marble in grams and record it in Data Table 1.
4. Release the marble from the top of the ramp and mark the exact spot the ball hits the paper.
5. Carefully measure the horizontal distance from the end of the ramp to the spot the ball hit. Record this measurement in meters in Data Table 1.
6. Repeat steps 4 and 5 at least two more times until you have three trials with consistent measurements.

DATA

Record your observations and analysis two data tables as shown. Variables are shown in parentheses.

Data Table 1			
Ramp height (h_1)			
Table height (h_2)			
Mass (m)			
Distance trials			

Data Table 2	
Average distance (d)	
Time elapsed (t)	
Horizontal velocity (v)	
Potential Energy (PE)	
Kinetic Energy (KE)	

ANALYSIS

For each of the following calculations, show your work and record the answers in Data Table 2.

1. Calculate the average horizontal distance (meters) traveled by the marble.

2. Calculate the time elapsed (seconds) from when the ball left the ramp until it hit the floor using where g is the acceleration due to gravity. $t = \sqrt{\dfrac{2h_2}{g}}$

3. Calculate the horizontal velocity (m/s) of marble when it's at the bottom of the ramp using $v = \dfrac{d}{t}$.

4. Calculate the potential energy (mJ) of the marble at the top of the ramp using $PE = mgh_1$, where g is the acceleration due to gravity and m is the mass in grams.

5. Calculate the kinetic energy (mJ) of the marble at the bottom of the ramp using $KE = \frac{1}{2}mv^2$.

CONCLUSIONS

- If mechanical energy was conserved as the marble went down the ramp, how should the amount of potential energy at the top of the ramp compare to the amount of kinetic energy at the bottom of the ramp? (At the top of the ramp, KE was zero. At the bottom of the ramp, PE was zero.)

- Find the difference between your calculated values for potential and kinetic energy. How close were these two values? Was mechanical energy conserved?

- Explain how your lab results can be consistent with the law of conservation of energy. Where did the missing energy go?

h_1

h_2

v

d