7A Energy in a System

NAME _____

How is energy related to motion?

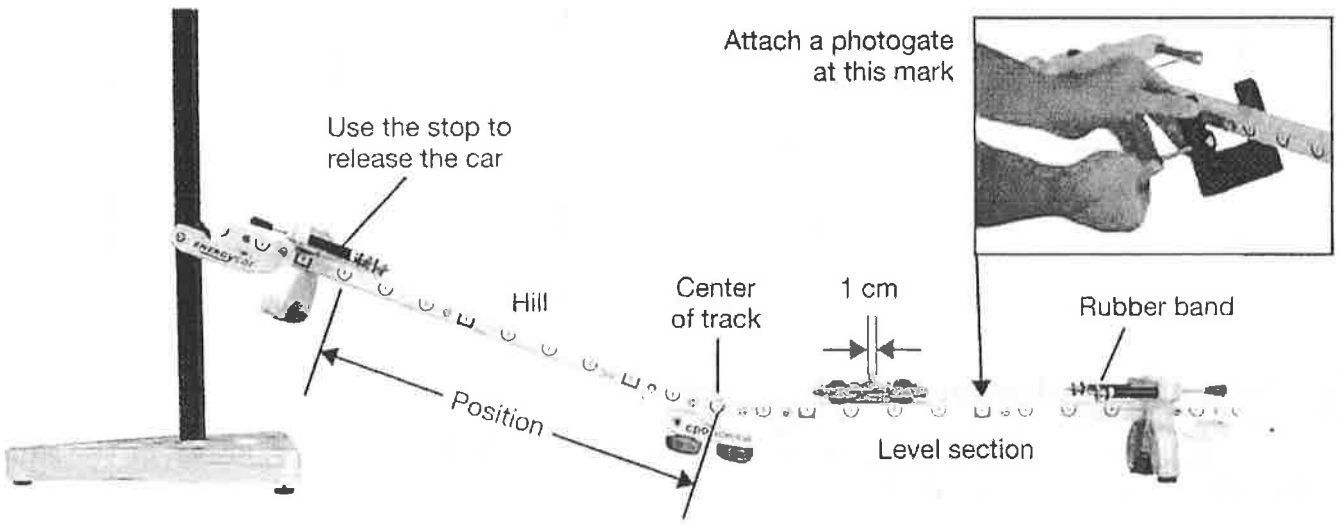
PER _____

A system is a group of objects that interact with each other. Energy measures the ability of a system to change itself or other systems. This investigation is about systems and energy.

Materials

- Energy Car
- Data Collector and one photogate
- Rubber band
- Physics stand

1 Making a system



1. Set up the track with the steeper hill and a level section as shown above.
2. Place a rubber band on the thumb screws at the bottom of the track.
3. Attach a photogate near the middle of the level section at the spot marked with a square.

2 Collecting data

1. Measure the distance between the center of the track and the stopper at the top of the track as shown above. Record this distance (the drop position) in Table 1.
2. Hold the car against the stopper and release it without giving it a push.
3. Record the time through the photogate before and after the car bounces off the rubber band. You will have to use the memory button to get the time before the bounce.
4. Calculate the speed of the car before and after it bounces. The speed is the width of the flag (1 cm) divided by the time it takes the flag to pass through the beam of the photogate. Record the speeds in the table.
5. Move the wooden track stop part of the way down the hill. Measure the distance from the center of the track to the metal stopper.

6. Drop the car as you did before. Measure the times and calculate the speeds.
7. Repeat for several drop positions along the hill.

Table 1: Speed data

	Before bouncing		After bouncing	
Drop position (cm from center)	Time through photogate (s)	Speed (cm/s)	Time through photogate (s)	Speed (cm/s)

3 Thinking about what you observed

a. How high did the car climb up the hill after bouncing? Did it go higher, lower, or the same height as the drop position?

b. How is the drop position related to the speed of the car the first time it passes through the photogate (before bouncing)?

c. How do the speeds before bouncing compare to the speeds after bouncing? Is this the same for all five trials?

d. What could you do to make the car travel farther up the hill after bouncing?

e. In one paragraph, explain how the answers to a, b, c, and d are explained using the idea of energy.