**ERHS Physics**
**Lab Report**

**Title:** Energy Conservation

I. **Purpose:** The purpose of this lab is to determine what percent of potential energy is returned as kinetic energy.

II. **Hypothesis:** The percentage of potential energy returned, as kinetic energy will increase as the velocity increases. The potential energy is lost through friction.

III. **Method:**

A. **List of Materials**

1. wooden cart
2. ramp attached to a ladder with eight rungs
3. photogate
4. meter stick
5. data table

B. **Procedure**

1. We measured the height of the ramp at the starting line and then at the finish line. Record.
2. Then we set the wooden cart on the ramp and lined the front end up with the ramp.
3. We released the cart and recorded the time recorded by the timer.
4. Finally we added our data to the class's data table.

IV. **Data** (see attached)

V. **Results** (see attached)

VI. **Conclusions:**

The results show that only a percent of potential energy returned as kinetic energy. as the cart's velocity increased, the percent of potential energy increased, to a certain point. The potential energy that was lost was 35% at the most, showing that the majority of energy returned as kinetic energy. These results further validate the Energy-Conservation Theory.

**Data:**

| Level | Height (starting line) | Height (finish line) | Time (in seconds) |
|---|---|---|---|
| 1 | .180 m | .075 m | .082 s |
| 2 | .335 m | .111 m | .054 s |
| 3 | .481 m | .144 m | .043 s |
| 4 | .637 m | .176 m | .037 s |
| 5 | .780 m | .210 m | .031 s |
| 6 | .932 m | .220 m | .029 s |
| 7 | 1.07 m | .252 m | .027 s |
| 8 | 1.24 m | .310 m | .026 s |

## Results:

- Calculation of potential energy, kinetic energy, and percent of kinetic energy returned as kinetic energy:

| | | |
|---|---|---|
| $P_E$= mgh | $K_E$= _ $mv^2$ | Percent returned= $K_E$/ $P_E$ |
| m= mass | m= mass | |
| g= gravity | v= velocity | |
| h= height | (distance/time) | |

Level 1

$P_E$= (1.012 kg)(-9.8 m/s)(.075m-.180m)= 1.04 J — v= .1m/.082 s= 1.22 m/s
$K_E$= (1/2)(1.012 kg)$(1.22m/s)^2$ = .75 J
%= .75 J/ 1.04 J= 72%

Level 2
$P_E$= (1.012 kg)(-9.8 m/s)(.111 m- .335m)= 2.22 J — v= .1m/.054s= 1.85 m/s
$K_E$= (1/2)(1.012 kg)$(1.85m/s)^2$= 1.73 J
%= 1.73 J/2.22 J= 78%

Level 3
$P_E$= (1.012 kg)(-9.8 m/s)(.144m -.481 m)= 3.34 J — v= .1m/.043s= 2.33 m/s
$K_E$= (1/2)(1.012 kg)$(2.33 m/s)^2$= 2.75 J
%= 2.75 J/3.34 J= 82%

Level 4
$P_E$= (1.012 kg)(-9.8 m/s)(.176m-.637m)= 4.57 J — v= .1m/.037s= 2.70 m/s
$K_E$= (1/2)(1.012 kg)$(2.70m/s)^2$= 3.69 J
%= 3.69 J/4.57 J= 81%

Level 5
$P_E$= (1.012 kg)(-9.8 m/s)(.210m-.780m)= 5.65 J — v= .1m/.031s= 3.23m/s
$K_E$= (1/2)(1.012 kg)$(.3.23m/s)^2$=5.28
%= 5.28J/5.65J= 93%

Level 6
$P_E$= (1.012 kg)(-9.8 m/s)(.220m-.932m)= 7.06 J — v= .1m/.029s= 3.45 m/s
$K_E$= (1/2)(1.012 kg)$(3.45)^2$= 6.02 J

%= 6.02 J/7.06 J= 85%

<u>Level 7</u>

$P_E$= (1.012 kg)(-9.8 m/s)(.252m- 1.07m)= 8.11 J        v= .1m/.027s= 3.70 m/s

$K_E$= (1/2)(1.012 kg)(3.70 m/s)$^2$= 6.93 J

%= 6.9 J/8.11 J= 65%

<u>Level 8</u>

$P_E$= (1.012 kg)(-9.8 m/s)(.310m-1.24m)= 9.22 J        v= .1m/.026s= 3.85 m/s

$K_E$= (1/2)(1.012 kg)(3.85m/s)$^2$= 7.50 J

%= 7.50 J/9.22 J= 81%

The results show that most of the potential energy returns as kinetic energy. As a trend, the percent of energy returned increases as the velocity increases until the velocity reached a certain point, 3.45m/s, and then the percent began to decrease. The results are significant because it validates my hypothesis that only a percent of potential energy will return as kinetic energy.