**Conservation of Energy Lab**

In this experiment you will use a ramp and marble to investigate the conservation of mechanical energy. To increase our accuracy, we will be using gravity to help us determine the velocity of a ball when it leaves a ramp. As the ball leaves the ramp, its velocity will only be in the horizontal direction. If we only consider the vertical components of the ball (*vi*=0m/s, *g*=-9.8m/s2, and the vertical drop *h2*) we will be able to find the time using the formula .

**Procedure:**

1. Clamp the ramp to a ring-stand and the table as shown in the diagram. Carefully measure *h1* and *h2*. Record your measurements in the Data Table.
2. Place a piece of paper on the floor in front of your ramp.
3. Find the mass of a marble and record it in the Data Table.
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 the Data Table.
6. Repeat steps 4 and 5 until you have filled the Data Table with a set of consistent measurements.

**Data**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Data Table** | | | | | |
| Ramp height (*h1*) |  | | | | |
| Table height (*h2*) |  | | | | |
| Mass (*m*) |  | | | | |
| Horizontal Distance Measurements (*d*) |  |  |  |  |  |

**Analysis**

For each of the following calculations show your work and clearly label your answer.

1. Calculate the average horizontal distance traveled by the marble.
2. Calculate the time elapsed from when the ball left the ramp until it hit the floor. Use.
3. Calculate the horizontal velocity of the marble when it is at the bottom of the ramp.
4. Calculate the potential energy of the marble at the top of the ramp using the bottom of the ramp as the zero reference point.
5. Calculate the kinetic energy of the marble at the bottom of the ramp.

Conclusion

1. If the 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 kinetic energy at the bottom of the ramp?
2. Find the difference between your calculated values for potential and kinetic energy. What the energy conserved?
3. Explain how your lab results can be consistent with the law of conservation of energy. Where did the missing energy go?

