

## **PROJECTILE MOTION LAB I THINK I HAVE LOST MY MARBLES**

**Purpose:** to investigate the independence of the horizontal and vertical components of motion

**Materials:** marble launcher, marble, time, and meter stick

**Procedure:** (Only pull launcher back to second slot)

1. Determine the muzzle velocity of the marble launcher. Record this number.
2. Determine the acceleration of the marble launcher. Record this number.
3. Set up a data table for the following information.
  - a. Angle of launch
  - b.  $v_{iy}$
  - c.  $v_{ix}$
  - d. Measured Time
  - e. Measured distance
  - f. Calculated distance
  - g. percent error
  - h. Calculated height
4. Launch the marble three times at each of the following angles: 15, 30, 45, 60, and 75.
5. Determine the average distance for each angle.
6. Record the distance traveled and time for each angle.
7. Calculate the  $v_{iy}$  and  $v_{ix}$  for each angle using your initial velocity that you determined for the muzzle velocity.
8. Calculate how high and how far the marble should travel at each angle.
9. Calculate the percent error for your horizontal distance traveled at each angle. Use the following equation.

$$\frac{|\text{Accepted value} - \text{experimental value}|}{\text{Accepted value}} \times 100$$

10. Write a conclusion explaining your results. Make sure to explain why your marble did not travel the calculated distance.

**Lab Write up:**

1. Title
2. Purpose
3. Data Table
4. Sample Calculations
5. Conclusion
6. Signed