

Name: _____

Date: _____

Lab – Projectile Motion – Effect of Angle and Mass

Objective: To determine what effect balls of different mass and ramps of different angles have on a projectile.

Equipment:

balls of different mass ramp cup meterstick
masking tape protractor

Procedure:

1. Set up a ramp on a lab table making sure there is plenty of room for the ball to roll off the table and hit the floor.
2. Make sure the ball will roll across at least 20 cm of flat table before rolling off the table's edge. Record the exact horizontal distance below.
3. Have a time keeper record the time it takes for the ball to travel from the bottom of the ramp to the edge of the table (the horizontal distance you measured before). Do not let the ball roll off the table.
4. Repeat step three times to ensure that the times are similar and that the ball does not slow down at all. If it does slow down, shorten the length of the horizontal track.
5. Locate a position on the ramp. Mark it with tape so it can be certain that the release point is constant. Roll the ball down the ramp. Mark the exact spot the ball lands with masking tape and measure this as the actual horizontal range.
6. Repeat this procedure two more times for balls of a different mass.

Data:

Mass of ball	_____	_____	_____
Horizontal distance	_____	_____	_____
Time 1: ball rolling off table	_____	_____	_____
Time 2: ball rolling off table	_____	_____	_____
Time 3: ball rolling off table	_____	_____	_____
Actual horizontal range	_____	_____	_____

Analysis/Calculations:

For each question, each member must show the calculation for a unique trial.

1. Show how the horizontal speed was determined.
2. Show how the vertical distance was determined.
3. Show how the time spent in air was calculated.
4. Show how the horizontal range was calculated.
5. Calculate the percent error for your horizontal range. Remember the predicted and actual values are different for each trial.

Conclusion:

1. Describe in a paragraph what factors could cause the ball to have missed the cup.
2. Is it possible to let the ball hit the ground and use the horizontal range to determine the horizontal speed the ball left the table? Explain.
3. Explain how the angle of the ramp makes a difference in your data.