Horizontal Projectile Motion Lab 09-26-03

Name _____ ____**o**

Purpose: To find relationships among the variables (v, t, Δx, Δy) in a horizontal projectile motion problem. To compare the actual range to the predicted range.

PART A: Setup

1. Set up a pair of photogates 1.5 cm apart at the edge of the dynamics track. RECORD the photogate spacing in meters as Δx_{gates}.
2. Measure the height of the track above ground at the edge by the photogates. RECORD this as Δy.
3. Open the Data Studio file named "Horizontal Projectile".

PART B: Procedure

4. Copy the data table below onto a blank sheet.
5. Make a few trial runs. Tape a piece of paper on the floor where the ball will hit. Lay a piece of carbon paper over it.
6. Use the plumb bob to find a spot on the floor under the photogates.
7. With a piece of tape, mark the location on the floor directly under the point of the plumb bob. The outer edge of the tape should be under the point.
8. Roll the yellow plastic ball straight through the photogate pair and, using Data Studio, measure the time for the ball to break both beams. (It will be called 'elapsed time' in Data Studio.) RECORD this time as t_{gates}.
9. Measure the <u>perpendicular</u> distance from the tape to the mark left by the ball. RECORD this as Δx_{meas}.

PART C: Calculations

10. Calculate the velocity of the ball through the gates for each run and RECORD it as v_{gates}.
11. Calculate the time the ball should have taken to fall to the floor and RECORD this as t_{fall}. This value will be the same for all trials.
12. Calculate the range predicted and record this as Δx_{calc} and RECORD it.
13. Calculate the %error between Δx_{calc} and Δx as found in part B. Use the measured value as the accepted value.
14. Show a sample of each calculation in the space to the right of the data and results tables.

Horizontal Projectile Data and Calculations

Name _____ ____o

DATA:

Part A

Δx_{gates} (m)	Δy (m)

Part B

trial	t_{gates} (s)	Δx_{meas} (m)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

RESULTS:

trial	v_{gates} (m/s)	t_{fall} (s) (all same)	Δx_{calc}(m)	% error
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				