PHYSICS NAME ________________________
LAB: **PROJECTILE MOTION / RANGE OF A ROLLING BALL** DATE ____________ PERIOD___

LAB PARTNERS: _____________, _____________, _____________, _______________

PURPOSE: To predict the landing point of a ball rolled off a table.

BEFORE DOING STEPS 1-3, NOTE THE FOLLOWING:

1) CATCH THE BALL AS IT ROLLS OFF THE TABLE!...DO NOT LET IT HIT THE FLOOR!

2) **BE SURE TO RELEASE THE BALL FROM EXACTLY THE SAME POINT ON THE RAMP EACH TIME.**

PROCEDURE:

1. Set up a ramp and track on the lab table as shown in class prior to the lab.
2. Measure the distance the ball travels on the **horizontal** part of the track(to nearest 0.1 cm). Record in the table below.
3. Establish a release point on the ramp approximately 25 cm above the table top. Let the ball roll down the ramp, and then time its travel over the measured horizontal distance **(CATCH IT!)**. Use a stopwatch which times to at least 0.1 second. Record in the table below. Repeat and record the timing four more times, and then find the average time.

DISTANCE	TRIAL	1	2	3	4	5	AVERAGE
cm	TIME (s)						

4. Use the distance and the average time to determine the speed of the ball as it rolls across the table (assume friction is negligible and speed therefore remains constant). Show standard 4-part sample calculation.

$$v = \frac{d}{t} = \frac{\_\_\_\_\_\_\_\_\_\_ \text{ cm}}{\text{s}} =$$

5. Measure the height of the lab table (to nearest 0.1 cm). Record as appropriate variable below.
6. Use kinematics equations to determine the horizontal distance from the table at which the ball will hit the floor. In each of the spaces below
   a) **NEATLY AND CLEARLY** LIST VARIABLES WITH VALUES AND **UNITS**
   b) **NEATLY AND CLEARLY** SHOW **EQUATION** USED, CALCULATION, AND ANSWER (INCLUDING UNITS)

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VERTICAL

V_i =

d =

V_f =

a =

t =

EQUATION & CALCULATION:

HORIZONTAL

V_i =

d =

V_f =

a =

t =

EQUATION & CALCULATION:

******* STOP! *******

DO NOT PROCEED UNTIL YOU HAVE COMPLETED THE ITEMS ABOVE!

7. Record the predicted horizontal distance (to nearest 0.1 cm) from the other side in the table below.

******* STOP! *******

AT THIS POINT BE SURE THAT **ALL** MEMBERS OF THE LAB GROUP HAVE COMPLETED **EVERYTHING** TO THIS POINT. THEN CALL ME OVER TO INITIAL **ALL** PAPERS AND OBSERVE THE REST OF THE PROCEDURE WITH YOUR GROUP. FAILURE TO GET MY INITIALS **BEFORE** PROCEEDING MAY REDUCE YOUR CREDIT FOR THE LAB.

TEACHER INITIALS:__________

8. Fold a piece of 8.5" x 11" paper in half **lengthwise**. Then unfold the paper and put it flat on the floor so that the center of the piece of paper is on the spot where your calculations predict the ball will land. A "plumb bob" (a paper clip tied on the end of a piece of string will do) should be used to locate the point on the floor which is directly below the end of the track, and your predicted distance should be measured from this point. The paper should be oriented with the crease from the fold parallel to the edge of the lab table.

Place a piece of carbon paper **carbon-side-down** on the sheet of paper.

Let the ball roll from its starting point on the ramp, and see where it lands. Hopefully it will land on the paper (!) and leave a carbon mark (try to catch it on the first bounce to avoid other bounce marks).

9. Measure (to nearest 0.1 cm) the perpendicular distance from the carbon mark to the crease line on the paper. This represents the error. Record in the table below.

10. Determine the % Error between the predicted, or theoretical, distance and the actual, or experimental, distance. **Show the calculation in the space next to the table**, and record the result in the table.

% ERROR CALCULATION

PREDICTED DISTANCE	cm
ERROR	cm
% ERROR	%

CREDIT FOR LAB: WHEN EVERYTHING ABOVE HAS BEEN COMPLETED, OBTAIN MY INITIALS ON THE LINE BELOW. I WILL EITHER IMMEDIATELY RECORD THE SCORE OR ASK YOU TO PUT THE LAB IN THE BOX FOR LATER RECORDING.

TEACHER INITIALS: ___________