Physics 3204
Core Lab # 1. Initial Velocity of a Projectile

(Outcomes: 214-14, 214-16, 212-1, 213-5, 212-2, 213-3, 325-6)

Pre-Lab Questions

Name:_____

Partners:_____

_____

_____

1 Define projectile motion. (1)

2 A ball moves across a table and falls to the floor. Sketch a diagram to show the path of the ball. (1)

3 Imagine a second ball was dropped from the table top at exactly the same time the first ball rolled off the table. **Compare** the times for both balls. (Explain) (2)

4 What formula is used to calculate the time for the first ball to strike the floor? (1)

5 Define what is meant by the range for a projectile? (1)

6 What formula is used to calculate the range for the first ball? (1)

7 A ball rolls of the edge of a horizontal table that is 1.25 m above the floor. It strikes the floor at a point 1.50 m horizontally away from the edge of the table top.

(A) How long was the ball in the air? (2)

(B) What was the speed of the ball at the instant it left the table top? (2)

Purpose: To find the initial velocity of a projectile.

Materials:

Heavy Die Cast Metal Dinky Car	Hot Wheels Track Ramp
Metre Stick	Retort Stand
Blank Paper	Clamps
Lipstick	Tape
Tissues	

Procedure: Same procedure as in text, page 119, except that we are substituting a dinky car for a steel ball. Also, instead of using carbon paper, we will mark the dinky with lipstick to obtain a mark on white paper. Do a trial run with the dinky unmarked with lipstick to determine the positioning of the paper on the floor. Reduce the number of trials to three (3) in step #8 of the procedure.

Data:

Trail #	Vertical Height (m)	Range (m)	Calculated time to fall (s)	Calculated Initial Velocity of the Ball (m/s)
1				
2				
3				

Average initial Velocity:_____

Sample Calculation for Time to Fall

Sample Calculation for the Initial Velocity

Analysis

1 Find the final velocity of the dinky and compare it to the initial velocity. (2)

2 What were the three values that were implied in doing this experiment? (3)

3 Why did we use three trials instead of one? (1)

4 Why don't we need the angle of the ramp? (1)

5 If another dinky was dropped at the same time as the moving dinky left the table, which one would land first? Explain. (2)

6 If the ramp was moved to the end of the table, how does that change the experiment? Explain. (2)

7 Alternate method to find the velocity of the dinky when it leaves the ramp.

Using the Law of Conservation of Energy:

$$E_{g\ (top\ of\ ramp)} = E_{k\ (bottom\ of\ ramp)}$$

$$mgh = 1/2mv^2$$

$$gh = \tfrac{1}{2}v^2$$

$$V^2 = 2gh$$

Use this formula to find the velocity of the dinky when it left the ramp. Compare it to the answer you had in the table. Is it different? Which formula gives the most accurate answer? Why? (4)