Name _____ Physics

# Build Your Own Projectile Launcher

## Introduction:

A projectile is considered anything that moves through the air under only the influence of gravity. Your task is to create a projectile motion launcher using the following materials.

## Materials:

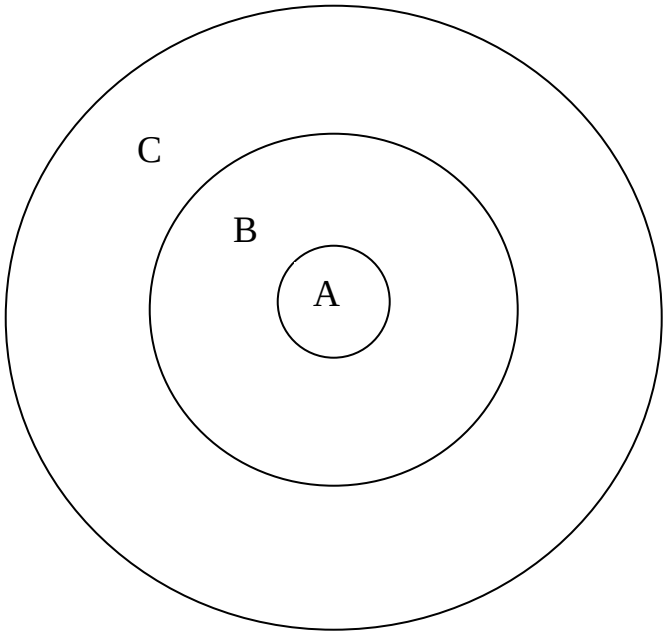
- Popsicle Sticks (35)
- Rubber bands (3 of different sizes)
- Marbles (2)
- Straws (5)
- Tape
- Any other materials you can bring from home

## Launcher Requirements

Launcher must have a range of 1, 2, and 3 meters

## Grading for this Lab

- 1/2 of your grade will be graded on your ability to hit a flat target like the one shown below. The ring that your projectile lands in will determine your grade. You will have three chances and your grade will be the average of these three trials (at ranges of 1,2, and 3 meters).
- 1/2 is based on completion of the attached lab worksheet for this project
- During the course of your experimentation, complete the table that is listed on this lab handout.



## Prelab

Brainstorm and draw a final NEAT sketch, using pencil, of you launcher below.  Label lengths, points of reinforcement, angles, etc..all you can think of

## Table

Complete the following table with data from your experiments (practice trials). Use the steps below for assistance and SHOW ALL WORK.

| Trial | Actual x-Distance (m) | Time in Air (s) | Max Height (m) | Initial x- Velocity (m/s) | Initial y-Velocity (m/s) | Initial Velocity (m/s) |
|---|---|---|---|---|---|---|
| 1 m | | | | | | |
| 2 m | | | | | | |
| 3 m | | | | | | |

1. **Actual x-distance** is the distance the projectile actually travels in the x-direction; also known as the range. Attempt trials to reach 1,2, and 3 meters and place the actual distance the projectile travels in these boxes.

2. **Time in Air** is recorded with a hand timer to the best of your ability for each of the distances.

3. **Max Height** can be figured out by using half of the total time the projectile was in the air and an equation from your reference tables. Show these calculations below.

1 m trial

2 m trial

3 m trial

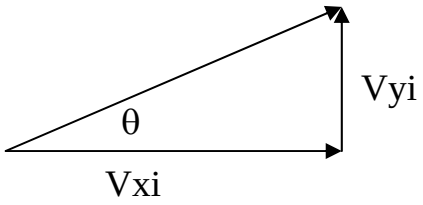
4. **Initial x – velocity** can be calculated by knowing how far the projectile went in the x-direction and the total time that the projectile was in the air. Show these calculations below.

1 m trial

2 m trial

3 m trial

5. **Initial y – velocity** can be calculated by knowing the initial x – velocity and the angle at which the projectile is launched. This is easy if we think of it like a right triangle




We can use: $\tan \theta = \frac{Vyi}{Vxi}$

We can solve this equation for Vyi for each of the trials:

1 m trial

2 m trial

3 m trial

6. **Initial Velocity** can be obtained by using the Pythagorean Theorem and the initial x and y velocities.

1 m trial

2 m trial

3 m trial

## Postab Questions

1. What were some flaws or sources of error in your experiment?

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2. What would you have changed to obtain better results?

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3. Name three places where you have seen projectile motion.

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