Group Members

- **Group Leader**
  - Jason Miller
    - Introduction
    - Results
    - Conclusion

- **Other Members**
  - Michael Bayne
    - Discussing Sketches
  - Ryan Clark
    - Building of prototype and Build, Document and Test
  - Justin Morris
    - Objectives, Brainstorming, and Gather Information
  - Melissa Morris
    - Revisions and Venn Diagram
The Design of a Catapult

Eers$^2$
Team Five
Introduction

- Problem
  - Propelling a 50 gram object 3 meters and striking a 3 inch diameter bulls eye with a catapult whose dimensions do not exceed 1.5’X1.5’X1.5’.
Methodology
Define the Overall Objectives

- Launch a golf ball weighing 50 grams 3 meters
- Consistently hit bulls eye on target
- Fit inside a 1.5’X1.5’X1.5’ box
- Account for safety
- Apply trigger mechanism
Choose A Design Strategy

- Brainstorming
  - Make maximum dimensions
  - Wood and PVC pipe
  - Spring or Bungee
  - Counter-weights
  - Independent stop-bar
Gather Information

- Materials Needed
- Tools Needed
- Locate Work Area
- Discuss Possible Designs
Make a First Cut at the Design

Sketches and notes:
- Frame to replace with two 2.5x1.5 at 45° cuts
- Golf ball, squash ball cut in half
- Tennis ball
- Lock loop
Building the Catapult
Build, Document, and Test Prototype
Revise and Revise Again!

- **Initial Design**
  - Plywood base
  - Non-Adjustable Arm
  - Spring
  - Frame held with screws
  - Arm resting on cross bar

- **Revised Design**
  - Solid Poplar Board
  - Added adjustments
  - Bungee cord
  - Reinforced base with dowel rods
  - Arm has bushing insert
Test The Finished Product

- Accuracy
- Precision
- Visual Appeal
- Safety
Design Cycle

Brainstorming:
* springs/counterweights
* final-metal base (steel)
* final-paint
* normal PVC pipe
* rubber tubing
* idea of stop bar

Prototype:
* plywood base
* 2x4's as frame
* cup (half racquet ball inside half tennis ball)
* long bolt (hold arm)
* bungee cord
* electrical PVC pipe
* dowel rod (stop bar)
* 2 eye screws (trigger)

Final Design:
* stained
* thick poplar base
* routed the edges
* arm adjustable (drilled multiple holes in arm)
Results
## Testing Results

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Accuracy and Precision

Results from Three Trials

1 hit
3 hits
5 hits
Conclusion

- We found that in order to propel a 50 gram object 3 meters and strike a 3 inch diameter bulls eye with a catapult whose dimensions do not exceed 1.5’X1.5’X1.5’ we had to overcome many engineering processes.