Consensus Consulting Corporation

The Catapult Project

Objectives

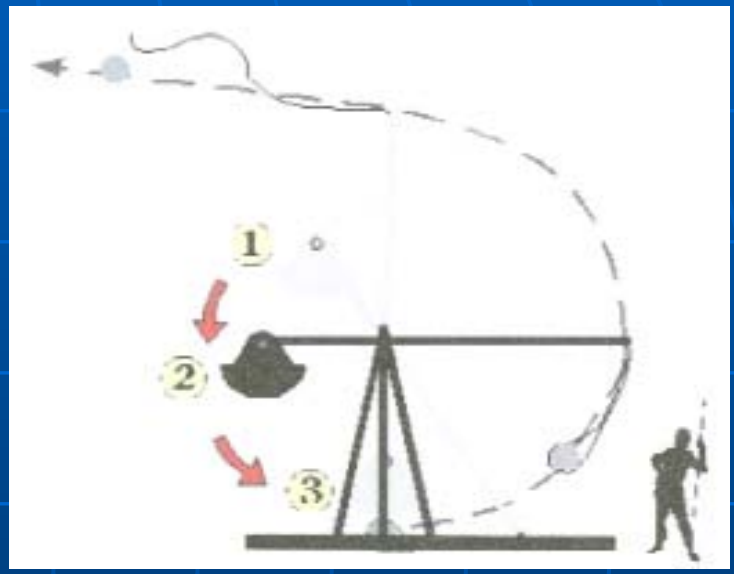
- Engineer and construct a device that will:
  - Launch a 50 gram golf ball a distance of three meters
  - Be no more than 1.5 cubic feet in size
  - No Mechanical Devices for launching the projectile
  - Be consistently accurate enough to repeatedly strike a target with a bulls eye 3 inches in diameter, 20.5 inches off the ground

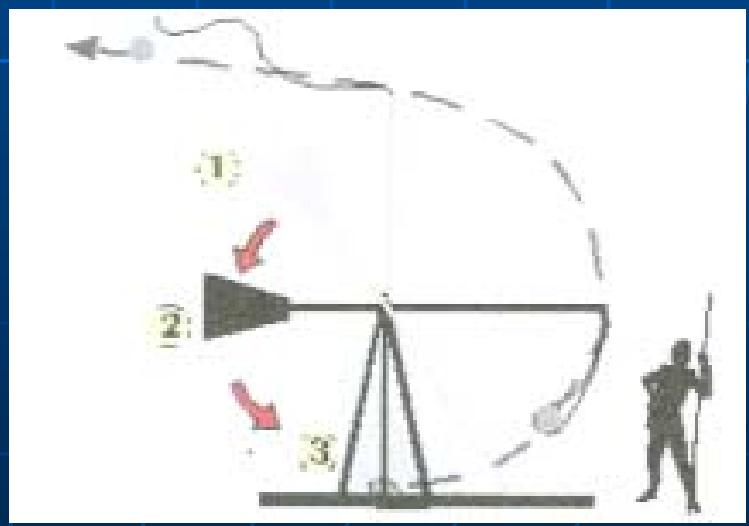
Personal Objectives

- Cost Efficient
- Safety
- Small Size
- Accurate and Adjustable
- Originality
- Aesthetics

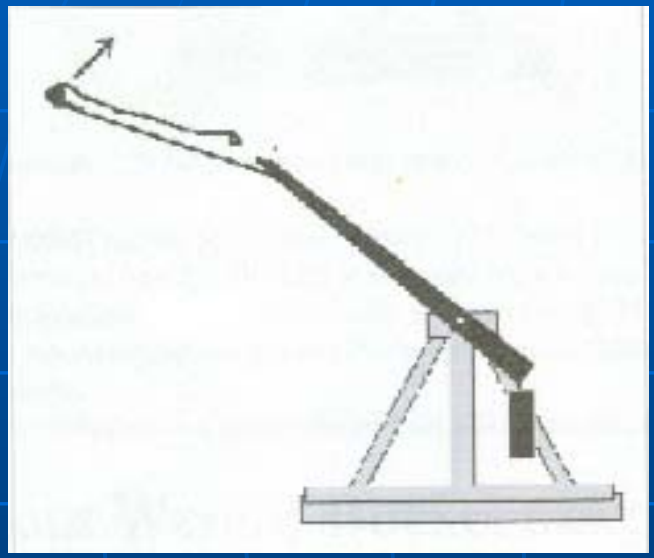
Planning and Brainstorming

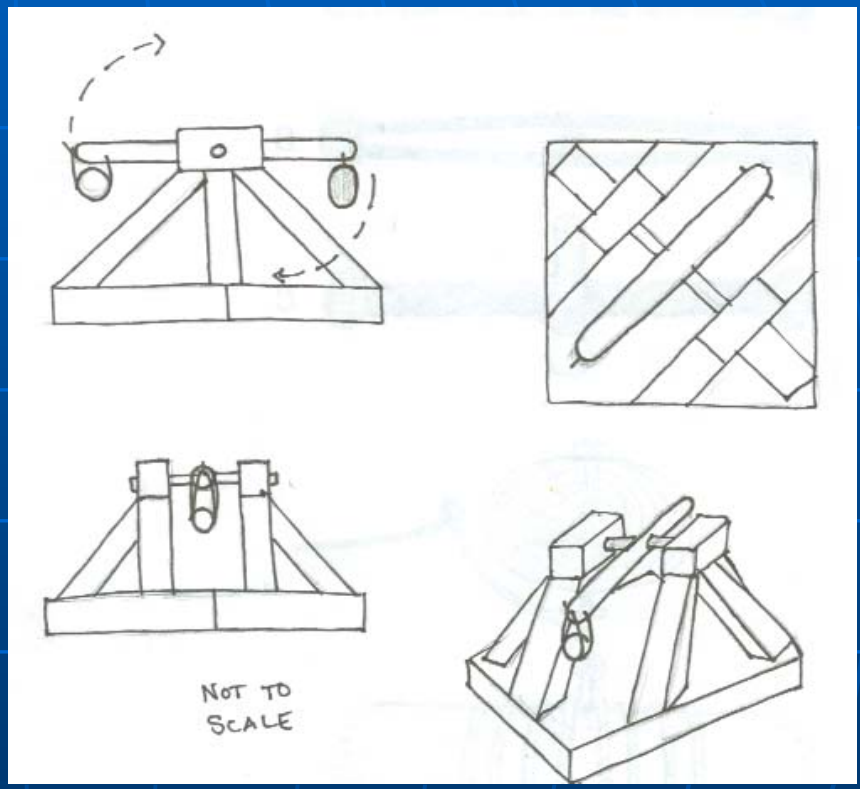
- Trebuchet
  - Pros
    - Very simple
    - Powered by only gravity
    - Sling design allows for more accuracy
  - Cons
    - Design not efficient under size restrictions
    - Lack of trigger mechanism

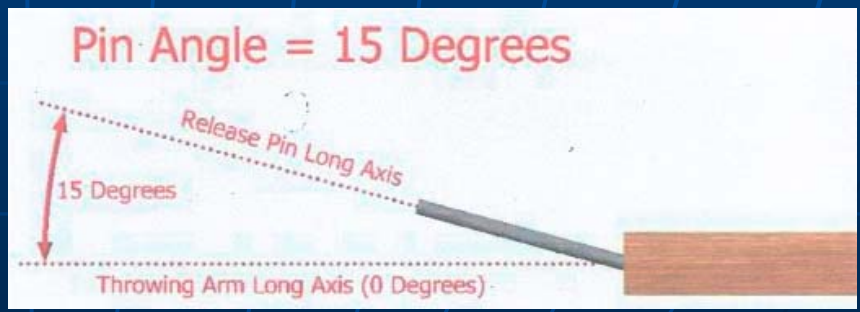




Planning and Brainstorming

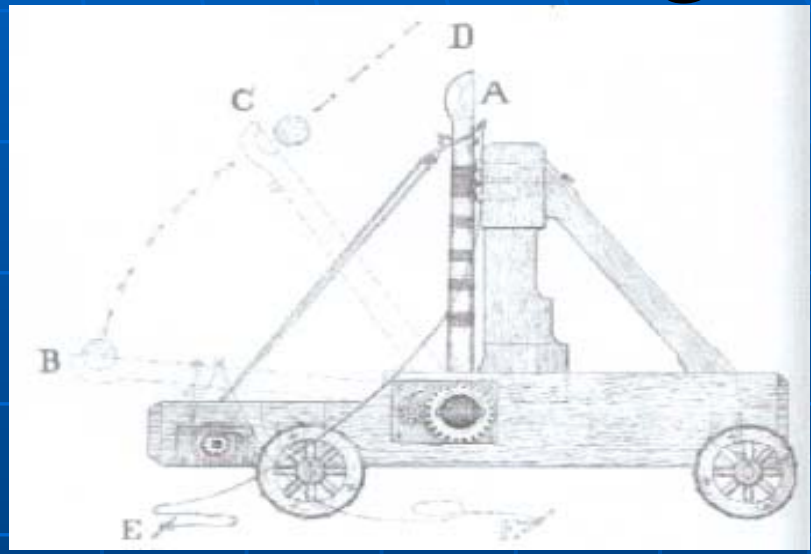


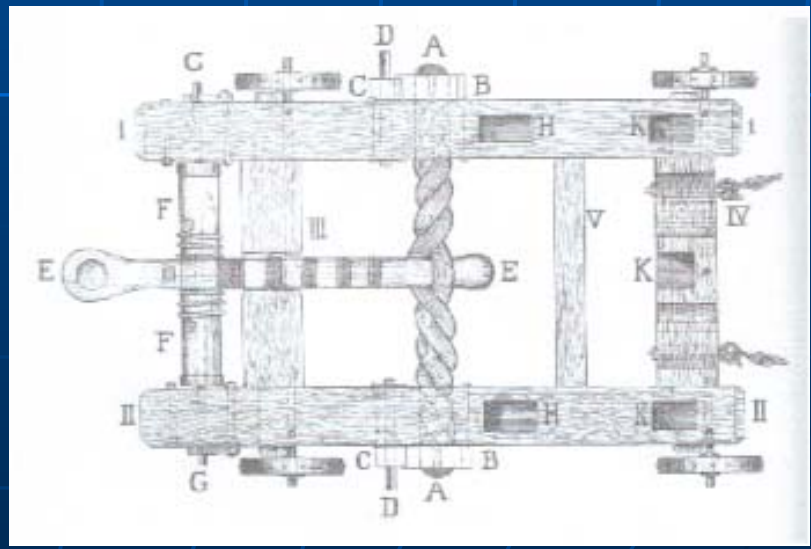




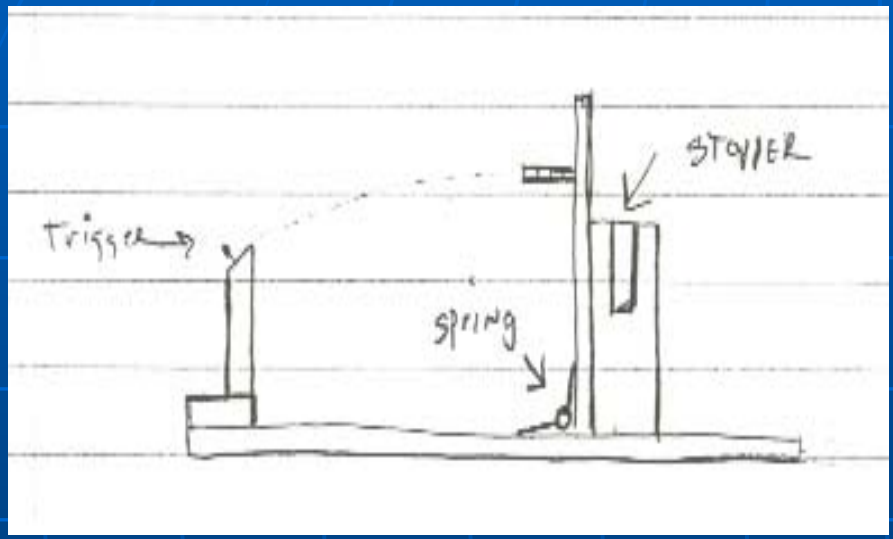
Planning and Brainstorming

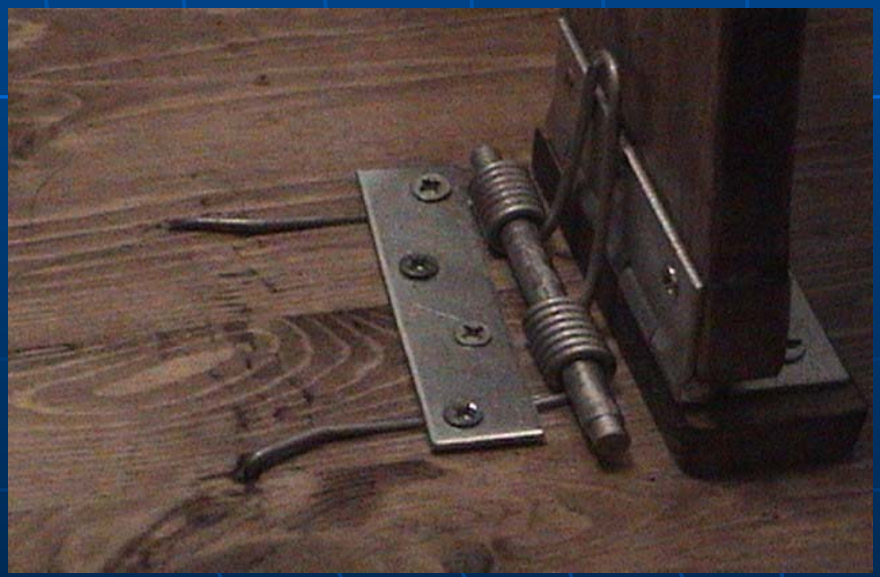
- Catapult
  - Pros
    - Consistent power source
    - Better trigger mechanism
    - Easier to build
    - Simple design
  - Cons
    - Requires more weight for stability
    - Spring may lose tension

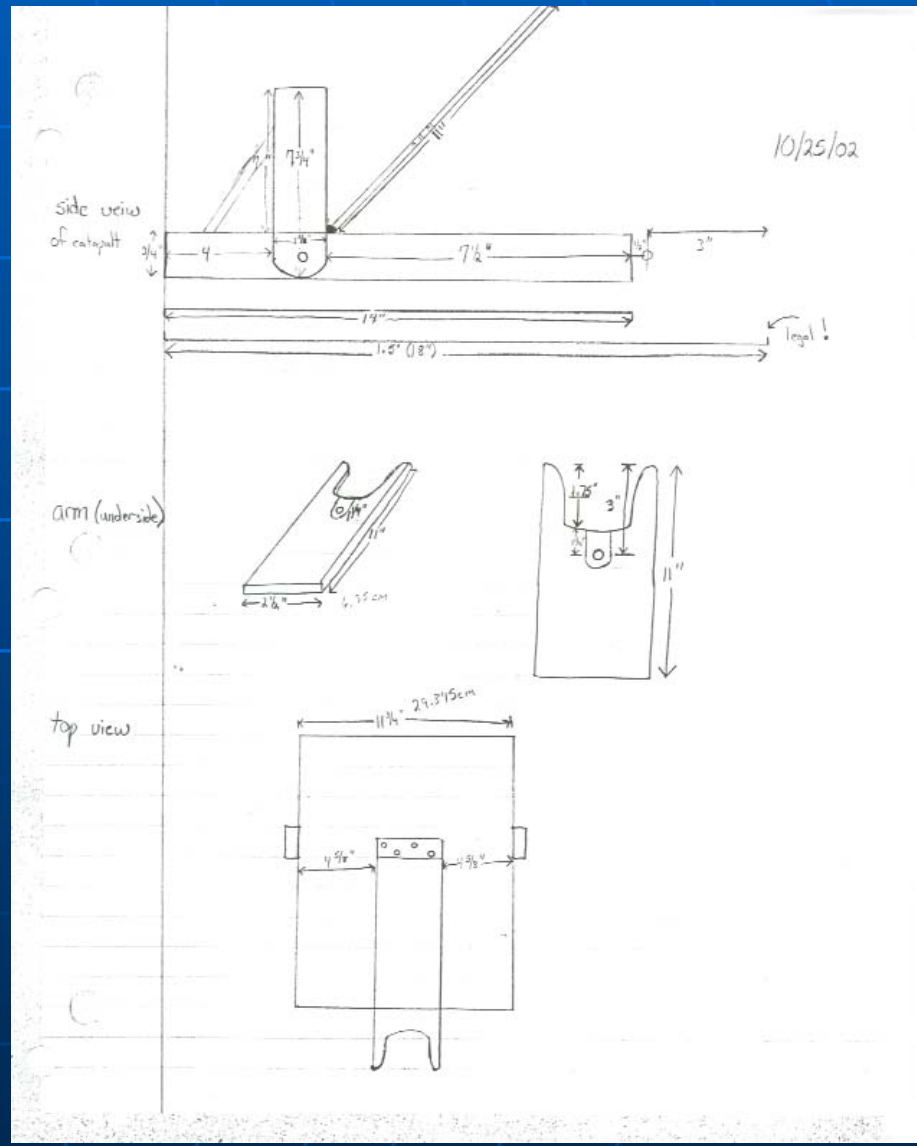




Planning and Brainstorming





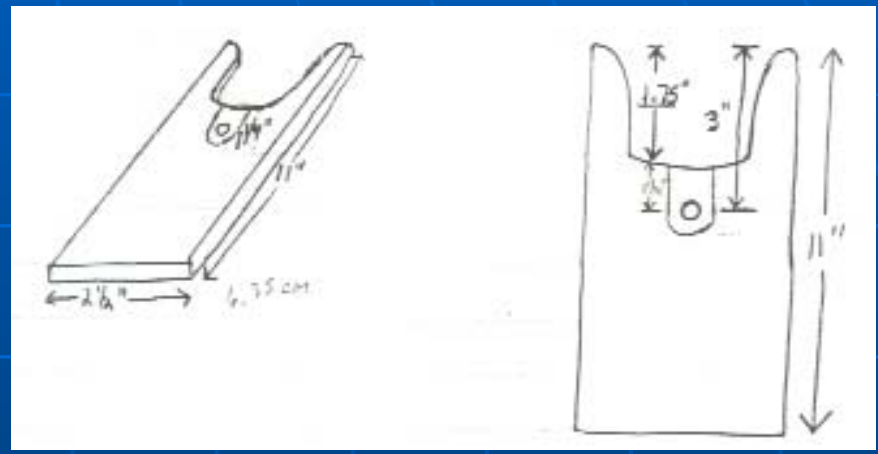


First Prototypes and Testing

- Trebuchet (Discontinued)
  - Design flaws
    - Fulcrum could not be of sufficient length to produce enough force
    - Counterweight could not be large enough to fit within the size constraints
  - Design perks
    - Sling for added power and accuracy
  - Learning experience

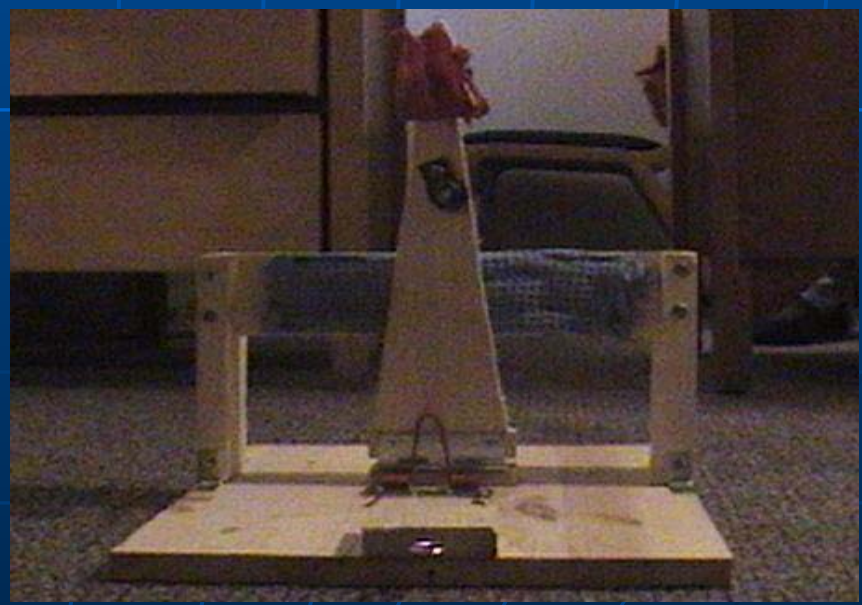
First Prototypes and Testing

- Catapult
  - Design flaws
    - Spring could not fully compress
    - Projectile not secure
      - Arm obstructed projectile
    - Improperly placed trigger
    - Inaccurate aim
  - Design perks
    - Adjustable Trigger
    - Powerful spring
    - Small Size
  - Learning experience



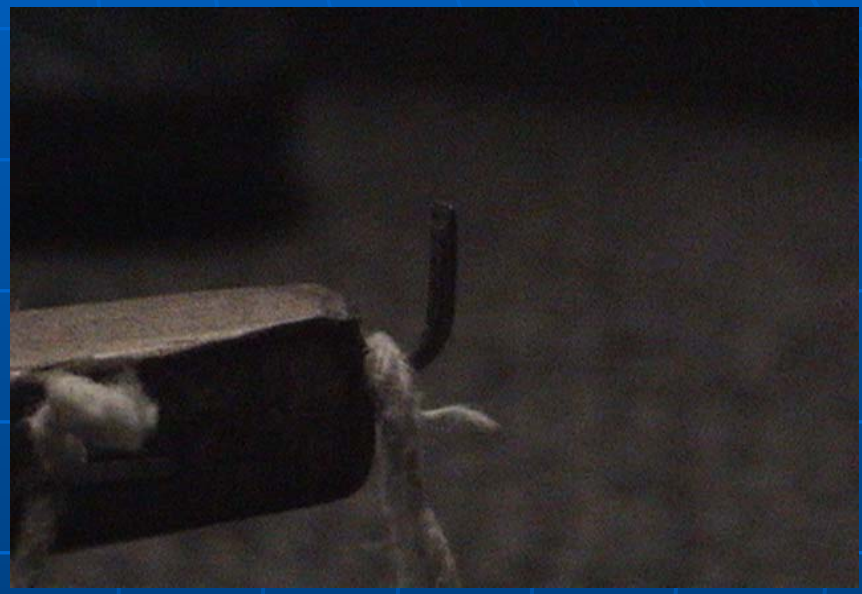
First Revisions

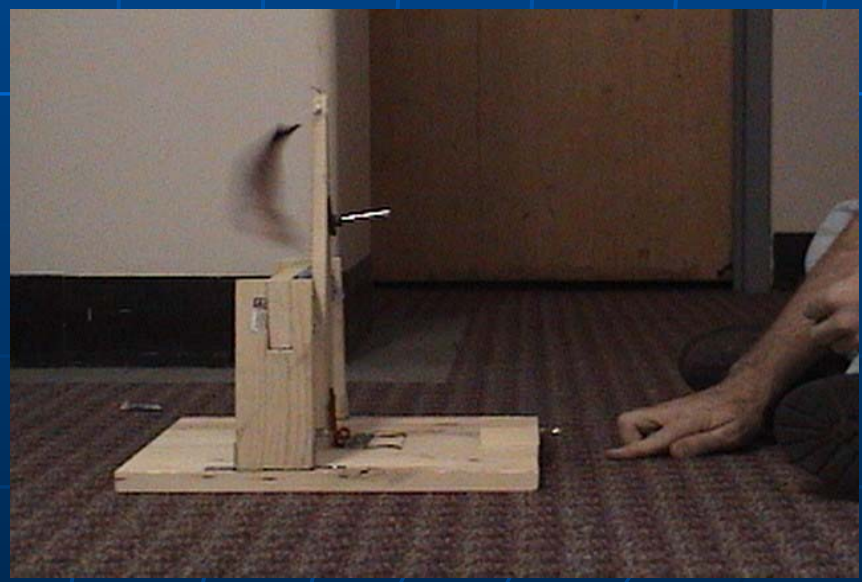
- Combined Best Previous Designs
  - Spring and Sling
    - Using the spring loaded catapult as a base, we added a sling similar to the trebuchet's
    - Designed a different arm to better accommodate the sling



First Revisions

- Spring and Sling
  - Sling release point
- Other Additions
  - Duct tape to bottom





First Prototype and Testing

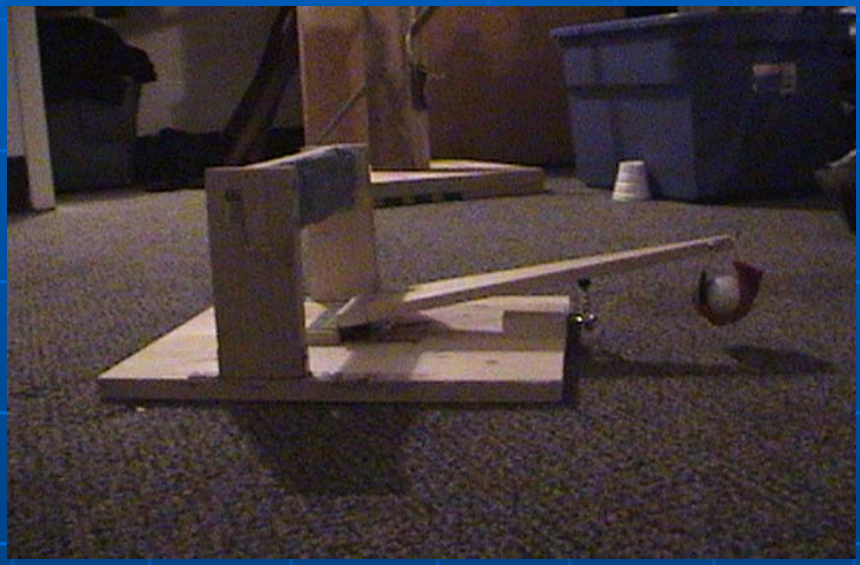
Personal Testing

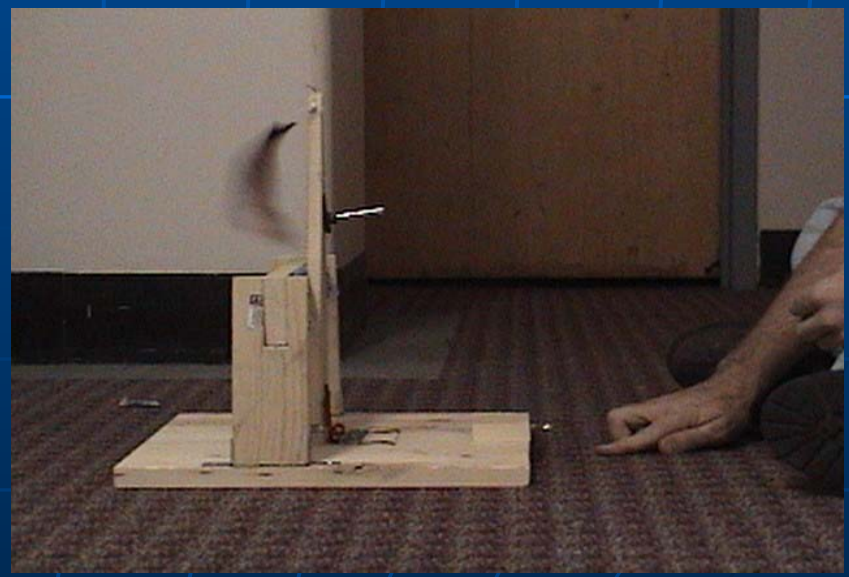
- Pouch stabilized

- Notch 1 – Hit top of door frame
- Notch 2 – Hit ceiling
- Notch 3 – Hit ceiling higher

- Conclusions:
  - Greater the power with the pin in the same position, the ball will be thrown higher
  - With pouch stabilized, accuracy is more consistent
  - The further the pin is angled at 90 degrees, the more the ball will shoot higher. The smaller the angle of the pin, the more the ball will be thrown down.

Testing





Testing In Class Prototype

Prototype testing 11/7/02

	Shot	position to Bulls Eye	Pin level
1.	80 pts	High to the left	3
2.	90 pts	Slightly to the left	1
3.	100 pts	Bulls eye	1
4.	100 pts	Bulls eye	1

- Shot #1 = Default
- Total 290 pts
- Current ranking 1st out of 8

Final Revisions

- Stabilized Pouch
  - Greater accuracy
- Aiming Mechanism and Trigger Combination
- Aesthetics
  - Stained

Results and Conclusions

- Materials Used
  - 1 Eyehook
  - 1 Paneling Nail
  - ½ Car Fender Clip
  - 2 Inch Coter Shaft
  - 1 Coter Pin
  - 4 L-brackets
  - 1 Door Hinge
  - 1 Metal Plate
  - 29 Screws (Variable Sizes)
  - 11 Staples
  - 1 Air Pump Spring
  - 10 inches of String
  - 1.5 Ft^3 Camo Fabric
  - 3 Inch Metal Shaft
  - Approximately 2 Board Feet of Pine
- Total Cost
  - Estimated $13.87