Physics Catapult Competition

Event Description: Teams of two to four people will build a catapult which is designed to throw a softball as far as possible.

Specifications:

1. Catapult must have an arm designed to throw the ball. A sling may be used maximize throwing potential, but slingshot devices are not permitted.
2. When cocked, your catapult must fit inside a 3m x 3m "launch box" that will be drawn on the ground.
3. When cocked, your catapult must be no taller than 2 meters.
4. Your catapult must have a triggering mechanism which will allow you to stand outside the launch box.
5. No explosions or air pressure may be used to assist the performance of your catapult. In other words, the energy used to power your catapult must be provided by the device itself.
6. Your catapult must be able to be cocked by one person.

Competition Scoring: Each group will be allowed three launches. The best launch will be used as your score. The longest launch wins.

Logistics: Your catapult must be dropped off at the staging area prior to the start of school on launch day and completely removed from the competition grounds by 3:30 p.m. on that same day.

Analysis: Your group is to measure the amount of time your projectile is in the air using a stopwatch. Based on this information, as well as the horizontal distance traveled by your projectile, calculate the initial velocity imparted to the projectile by your catapult.

Reflection: Submit your answers to the following questions on the Catapult Score Sheet. You may answer #1 as a team. Answers to questions 2-5 should be your own.

1. Analyze your projectile's motion: ***show your answers in a table (example below)***
   - How far did your projectile travel horizontally?
   - How long was your projectile in the air?
   - What was your projectile's horizontal velocity?
   - How long did it take your projectile to reach its maximum height?
   - What was your projectile's initial vertical velocity?
   - What was your projectile's total initial velocity?
   - What was your projectile's launch angle?

Analysis Questions

2. How did undertaking this project improve your understanding of projectile motion?
3. How did you feel about this project when it was first assigned?
4. How do you feel about this project now that it has concluded?
5. What would you have done differently as you and your team worked through this project?

Example Table

Horizontal Motion		Formula	Vertical Motion		Formula	Projectile Motion		Formula
d_x			$d_{y\text{-}top}$			t_{tot}		
t_x			t_{up}			v_i		
v_{ix}			v_{iy}			Launch Angle		

Individual Scoring Rubric
Your Lab Report may be typed or handwritten. It must include the following:
Name:_____ Group Members:_____

Points
5 Turned in by deadline
15 Drawing of plans of catapult
5 Picture of Group and catapult (the picture will be available from our website)
10 Group Scoring
25 Data Table
30 Work Shown
10 Analysis Questions
100 Total Points

Use the table below to in order to evaluate your group members. Each Group will turn in this form with all members having been evaluated. The group will determine their own rubric for each criteria.

Student Name				
Assessment Criteria	10 Points Possible	10 Points Possible	10 Points Possible	10 Points Possible
Group Member follows directions				
Group Member cooperates with group members				
Group member always follows lab safety rules and lab directions				
Group Member stays on-task				
Group Member does their Job				
Total Student Points				