



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

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Project Title Trajectory of a Free Falling Object	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals How do you maximize the distance of an object shot from a trebuchet?</p> <p>Methods/Materials Procedure: 1. Measure counterweight, pin angle, and the string length; 2. Pull the counterweight up; 3. Put the arm in the arm holder; 4. Put the gate up; 5. Insert the safety; 6. Put the ring onto the pin; 7. Loosely load the golf ball into the net. Do not embed the golf ball within the netting; 8. Put on release; 9. Take off safety; 10. Stand as far as possible away from the trebuchet, at an angle in front of it and to the side (see Photo 1 for a picture of the trebuchet before shooting); 11. Take off release; 12. Watch and then record distance. I used these things: 1) Building; i) Wood; ii) Wood Screws; iii) Mesh for Launcher; iv) Plastic Wheels (3); v) Drill Press/Drill Bits; vi) Portable Drill; vii) Power Sander; viii) Opened Wrenches; ix) Tape measures (100 ft and 15 ft); x) Wood Glue; xi) Hammer; xii) Wood Clamps 5 2) To shoot: i) Golf Balls; ii) String (holds launcher mesh); iii) Pennies (counter weight); iv) Protractor used to measure pin angle; v) Pencil; vi) Clip board.</p> <p>Results First, I found that if you increased the counterweight you usually get a further distance traveled. Then again you also have a bigger chance of going in some direction that you did not want it to go. For this reason the more weight the more likely it is to fall over and collapse under its own weight. If it is off the ground by 1 mm then the whole shot could be invalid. Second, I figured out that the optimum pin angle was around 80 degrees I know this because all the best shots were around the 80 degrees mark. Lastly, was the string length and I was successful. My hypothesis was supported by showing that the longer the string the further it went because the 8 in string didn't go as far as the 12 in.</p> <p>Conclusions/Discussion My experiment had many twists and turns something that I could have done better on would have been to not put it off until the last month and get it all done with no time to spare. Next I should have gotten a longer string so I could have found the absolute best string length. The following things that went right are that there was barely any wind when I tested the distance. In addition to that my friends were willing to help me when I needed them to carry the trebuchet and materials needed for testing back and forth from the testing location.</p>	
Summary Statement How do you maximize the distance of an object shot from a trebuchet?	
Help Received Father helped my use the power tools	