



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Matthew J.H. Brokate	Project Number J0102
Project Title Ready... Aim... Fire!	
Objectives/Goals My objective was to determine which mortar design would launch a tennis ball the farthest; a mortar with one baffle or a mortar with two baffles.	
Abstract Methods/Materials Naphtha, tennis balls, pringles containers, fireplace matches, duct tape, 4inch thin-walled PVC pipe, drill, tape measure, teaspoon and hair dryer. I built two tennis ball mortars from three Pringles potato chip containers. One of them had a single baffle made in the bottom of the top can. The other one had a baffle in the middle can also. I heated each mortar with a hair dryer for two minutes before each firing. I poured one teaspoon naphtha down the barrel being careful to get passed the baffles into the base. I put the tennis ball in the barrel and it rested on the baffle. I held the ball in place and shook the mortar to vaporize the naphtha. I put the mortar into the firing tube and leaned it against a chair with a slight angle and lit the fuel air mixture through the firing hole in the base. Then I measured the distance that the ball traveled. I did the final trial six times with each mortar.	
Results My results were very different for each mortar. The mortar with two baffles fired the tennis ball as far as 101' while the mortar with one baffle only went 13'8" at the same angle. In all six of the final trials the mortar with two baffles fired the ball farthest and made the biggest bang.	
Conclusions/Discussion I thought that the mortar with one baffle would shoot the farthest because there would be more room for the naphtha to expand and mix with oxygen and make a lot of the fuel mixture. I learned that having the fuel mixture in a more confined area made it burn more efficiently and quickly which caused a bigger explosion. The baffle on top held the ball in place and the baffle on the bottom kept the fuel contained.	
Summary Statement My project is to find out which tennis ball mortar is more efficient at firing a ball; one with one baffle or one with two baffles.	
Help Received The chemistry teacher and the physical science teacher helped me work out the problems I had making the mortars work. My mom helped me build the mortars, typed the application and gave me encouragement.	