



**CALIFORNIA STATE SCIENCE FAIR  
2013 PROJECT SUMMARY**

<b>Name(s)</b> <b>Patrick R. Mullen</b>	<b>Project Number</b> <b>J0122</b>
<b>Project Title</b> <b>Ship Shape Hulls</b>	
<b>Objectives/Goals</b> My objective was to see how a boats hull shape can affect its speed and to show the more displaced water by the hull or the hull that is more submerged will go faster.	
<b>Abstract</b> <b>Methods/Materials</b> Materials: Styrofoam, Fishing line, Fishing weight, Photo Gate EA-24, Rain gutter, Timer ET-36, Industrial Washers, # inch PCV pipe, Pulleys.  I carved uniquely different boats out of styrofoam and ran them through a gutter filled with water and measured the speed with a photo stop timer.	
<b>Results</b> Boat 1 A rectangular,block of Styrofoam,had the second fastest times averaging 5.065 seconds. This boat had the most amount of displacement and submerged hull but had problems nose diving and therefore causing drag.  Boat 2 was the fastest boat of all because it had a steep bow slant. It had the least amount of Styrofoam carved out to shape it#s form. The slant prevented it from nose diving and while keeping most of its hull submerged. Although it had slightly less displacement than boat 1, it had an average time of 4.382 seconds. Boat 3, which had the symmetric and ideal hull shape of a speed boat with bow and forward side slants. This boat didn#t perform as well as expected because and had the slowest times with an average of 5.337 seconds. It had the least area of submerged hull so it displaced the least amount of water, but it had a bow shape the prevented it from nose diving. Boat 4 was the boat that performed the least consistent of all the boats. It had a range of times from 4.438 seconds to 5.664,Its shape was a blunt bow with cut out chimes running down the sides of the boat. It nose dived and displaced a medium amount of water in comparison with the other boats.	
<b>Conclusions/Discussion</b> This lab tested how a boat#s hull shape and design affects its speed due to water displacement. I conclude that the more of a boat#s hull that is submerged will cause a boat to move faster through the water by creating a bow wave that propels the boat through water.Also, an example of fluid friction was shown through boat 2 having less displacement then boat 1, yet moving faster because its bow shape allowed it to over come the bow waves. The chime of boat 4 worked at a pro and con level because the chimes took	
<b>Summary Statement</b> How the different shaped hulls affect speed through the water and the other factors that comtribute or inped its speed	
<b>Help Received</b> Father helped design and set up rig and helped compose graphs on power point.	