



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Eric J. Walz	Project Number J0129
Project Title Hydrodynamics and Drag	
Abstract Objectives/Goals Boats and subnarunes both use a lot of gas to run. These vessels might be able to have a better hydrodynamic shape which would reduce drag and fuel expenses. My goal was to see if there was a way that the shape of boats could be altered to create less drag and be more fuel efficient. Question: How does the shape of a body affect its hydrodynamic characteristics in water? Hypothesis: I hypothesized that a rounded body affects the hydrodynamic characteristics by forcing all of the pressure off from the middle of the craft which will reduce drag	
Methods/Materials Materials: 4, 90 degree corner 4 inch diameter ABS pipes, 10 ft length 4 inch diameter ABS pipe, drill, band saw, Miter saw, band sander, disk sander, 1 inch drill bit, 1/2 inch drill bit, 4 ft length 2 inch diameter wooden dowel, lead weights, hose, 1/8 inch rod bent and tack welded to form lever, mail scale, sanding sealer, fishing hooks, fishing line, eyelet screws. Method: I used my materials to build a circular track that would allow water to run through and create a pull of water.	
Results The rounder the shape the less drag that was created. Boats that had a blunt front caused the most drag, boats with smooth fronts caused the least amount of drag due to the surface area of the boat. I also tested the effects on the backs of the boats. Boats with smooth ends more often than not preformed better than boats with blunt ends. The shape that preformed the best was the elliptical shape.	
Conclusions/Discussion The shape of a body affects the characteristics by allowing certain amounts of water to pass around the craft at different speeds and angles. The different shape causes different things to happen in the water. The front end and the back end both play a role in the hydrodynamic characteristics. My hypothesis was correct. The rounder shape had the least amount of drag along with the elliptical shape which had similar results. The rounder the shape the more hydrodynamic it is in the water. Fineness Ratio is a ratio of the length over the width, so a long slender object with a curved front creates the least amount of drag.	
Summary Statement To determine the amount of drag created from different shapes on the front and back of boats	
Help Received Father helped with cutting the curve in the track; Mother and Father helped with glueing board;	