



# CALIFORNIA STATE SCIENCE FAIR 2008 PROJECT SUMMARY

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<b>Project Title</b> Maintaining Altitude	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> To determine which of the six horizontal stabilizers will be most effective on the flight of an airplane.</p> <p><b>Methods/Materials</b> Create six different designs of horizontal stabilizers from balsa wood. Test each design by placing the stabilizer securely in the slot in the back of the airplane. Build a launcher-control unit using plywood and attach a special release device to launch the aircraft. Place the airplane at a 20 degree angle and clamp it down on the launcher unit attaching the rubber band that extends 28 cm. Launch by pressing the quick release trigger located on clamp at the height of 2'10". The mean (average) is calculated by the results of all twelve trails in milliseconds (time traveled) and both centimeters/feet (distance traveled) using a stopwatch and tape measure. All results are recorded on a data sheet for each individual horizontal stabilizer. The same "Gullow's Folding Wing Glider" is used for each launch to test each horizontal stabilizer.</p> <p><b>Results</b> The triangular stabilizer(F) was most effective traveling the distance of 635.00 cm (250") and time of 2.44 milliseconds. The rectangle stabilizer(A) came in second in distance and time of 614.68 cm and 1.92 milliseconds. The trapezoid(E2) came in third with 548.64 cm in distance and 1.88 milliseconds. The curved stabilizer(C) ranked fourth in distance of 541.02 cm and 1.64 milliseconds. Fifth is the M-shape stabilizer(D) traveling the distance of 490.22 cm and 1.49 milliseconds. The V-shaped stabilizer(B) came in last in distance and time of 452.12 cm (178") and 1.42 milliseconds.</p> <p><b>Conclusions/Discussion</b> My hypothesis that the curved horizontal stabilizer(C) would be most effective was incorrect. The triangular horizontal stabilizer(F) was most effective because its design allowed air to transfer smoothly and evenly over the stabilizer without it losing altitude. The curved shaped stabilizer had enough surface area to keep it elevated, but it was too heavy to keep it in the air.</p>	
<b>Summary Statement</b> Design and test six horizontal stabilizer to determine which would be most aerodynamic to keep the plane elevated the longest and travel the greatest distance.	
<b>Help Received</b> My uncle, Chief Master Sergeant Young, took me to the March Field Air Museum so I could see where the horizontal stabilizers were located on certain aircrafts. He also gave me guidance when constructing the aircraft launcher. My mother took pictures at the museum and helped display them in my notebook.	