



California Science Center
CALIFORNIA STATE SCIENCE FAIR
2001 PROJECT SUMMARY

Your Name (List all student names if multiple authors.) Christian M. Jordan	Science Fair Use Only
Project Title (Limit: 120 characters. Those beyond 120 will be ignored. See pg. 9) Up, Up, and Away	J0914
Preferred Category (See page 5 for descriptions.) 9 - Fluid Mechanics/ Aerodynamics/ Thermophysics	Division J Junior (6-8) J Senior (9-12)
Abstract (Include Objective, Methods, Results, Conclusion. See samples on page 14.) Use no attachments. Only text inside these boxes will be used for category assignment or given to your judges.	
<p>Purpose: To test various angles of attack to determine which one creates the most lift on an airfoil, and to test two different airfoil shapes to determine if shape affects lift.</p> <p>Hypothesis: For Experiments 1 and 2, I believe that the airfoil at the 45 degree angle of attack will create the most lift. In Experiment 3, I now believe that maximum lift will occur at about 20 degrees, but will be different for each airfoil. I believe that the curved shaped airfoil will create the more lift at subsonic speeds than the flatter shaped airfoil.</p> <p>Method: Using a wind tunnel I measured the lift generated by balsa airfoils of different shapes at various angles of attack.</p> <p>Results: Experiment 1, with only a few data points - every 15 degrees up to 45 degrees, seemed to show that maximum lift occurred at 45 degrees. This is what I expected to see. Also, the airfoil created lift at 0 degrees. Experiment 2, with data points every 5 degrees showed that the maximum lift occurred at about 20 degrees, stall occurred at 25 degrees, and after 25 degrees I measured mostly drag. This is not what I expected in my initial hypothesis. I must have measured too few angles in experiment 1. Also, the airfoil created lift at 0 degrees. Experiment 3, I compared the lift from two different wing shapes. With data points every 2-1/2 degrees, the curved wing generated more lift like I expected. The curved wing created lift at 0 degrees.</p> <p>Conclusion: Initially I thought my results supported my hypothesis that the airfoil created the greatest lift at an attack angle of 45-degrees. But as I did more research and testing, I learned: maximum lift occurs closer to 20 degrees; stall occurs at an angle of attack just a few degrees more than the maximum lift angle; maximum lift depends on the shape of the airfoil (some airfoil shapes generate lift at 0 degrees angle of attack); and maximum lift is at different angles of attack for different shaped airfoils.</p>	
Summary Statement (In one sentence, state what your project is about.) My experiment is about the lift created by an airfoil at various angles.	
Help Received in Doing Project (e.g. Mother helped type report; Neighbor helped wire board; Used lab equipment at university X under the supervision of Dr. Y; Participant in NSF Young Scholars Program) See Display Regulation #8 on page 4. Used wind tunnel at Fruitvale J.H. Technology Lab.	