



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Travis J. Henderson	Project Number J0112
Project Title Lift Capabilities of Different Wing Designs	
Abstract Objectives/Goals This project was designed to answer the question: "Which wing design creates the most lift?" Research of various planes and their wing designs led to the following hypothesis: I believe that of the three wing types being tested, the delta winged planes' lift will be least affected by an increase in cargo weight. I also think that of the delta winged designs, the 16.2cm by 10.2cm delta will be the least affected by the extra weight. Methods/Materials Six wing designs of equal surface area were constructed. All wings were attached to plane bodies of like construction. To keep the thrust the same for all flights, a catapult launcher was used. All tests were conducted indoors to avoid problems with outside weather conditions. Each plane was first balanced and had its center of gravity marked, then flown five times without any added weight other than that needed for balance. This served as a control. To test lift, five conditions were created by evenly distributing weight around the center of gravity by adding one weight at a time to a maximum of five. Each design was flown five times under each condition. Distances of all flights were recorded for comparison. Results The results clearly showed that the 20.3cm by 7.6cm delta wing design was the best. To determine the best design, the difference of the control flight average distance and the maximum weight flight average distance was calculated and compared for each design. The 20.3cm by 7.6cm design had the smallest difference of 149.9cm. This was significantly less than the next closest design, the 16.2cm by 10.2cm delta wing which posted a difference of 179.3cm. The worst case was the straight tapered wing which had a difference of 410.5cm. Conclusions/Discussion My hypothesis was partially correct in that the delta wing designs, in general, had the best lift. However, the 20.3cm by 7.6cm winged plane was the least affected of all, not 16.2cm by 10.2cm as I thought. This must be because the 20.3cm by 7.6cm wing had more wing area near the center of gravity to minimize the effects of the added weight.	
Summary Statement This project was designed to determine the lift capabilities of different wing designs as payload weight increases.	
Help Received My dad took pictures while the project was conducted and gave me technical advice.	