



# CALIFORNIA STATE SCIENCE FAIR 2009 PROJECT SUMMARY

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<b>Project Title</b> <b>How Airplanes Fly</b>	
<b>Abstract</b> <b>Objectives/Goals</b> This experiment was designed to determine which aspect of airfoils should be changed in order to increase the amount of lift that a wing can produce when being tested in a wind tunnel. <b>Methods/Materials</b> The two aspects of airfoils that were being tested were the camber and the thickness. A control wing was tested in a wind tunnel and a weight scale was used to record the amount of lift that it produced. The scale measured the lift produced by recording the amount of force exerted the scale. Then two other wings, one with two percent more camber, and one with two percent more thickness were measured for how much lift they could produce. This would determine which aspect is more important when designing an airfoil. The airfoils were made from craft-grade styrofoam. The wind tunnel was created with household materials. Large Sparkletts# bottles were press fitted together to create an airtight seal. A household fan was then placed in the end of the tunnel. Paint sticks were then cut into small, rectangular squares. These were hot-glued in a grid formation. This grid was designed to break up any turbulence that could come off of the fan and insure that the airflow was laminar. <b>Results</b> The wing with an increased camber, which was known as Airfoil Number 2, produced 9.09 more grams of lift than the airfoil with an increased thickness, which was known as Airfoil Number 1. The Allstar Network explains this occurrence by saying, #The camber affects the speed of the air, and therefore the lift# ( <a href="http://www.allstar.fiu.edu/aero/airfly13.htm">http://www.allstar.fiu.edu/aero/airfly13.htm</a> ). Airfoil Number 1 produced 3.81 less lift than the control airfoil. <b>Conclusions/Discussion</b> This information would most likely be used by amateur builders making remote control planes, because these airfoil builders may not have access to computer simulations to help shape the airfoils. Testing the needed airfoils in remote control planes may prove costly if the airfoils do not perform well enough, and this cost can be avoided by using the results of this experiment.	
<b>Summary Statement</b> Testing different shapes of airfoils in order to increase the lift that they produce	
<b>Help Received</b> My dad helped supervise me with the use of power tools	