



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Giulia M. Castleberg	Project Number J0104
Project Title Lift Force of an Airfoil	
Objectives/Goals The intention of this project is to establish what shape of wing produces the most lift.	
Abstract Methods/Materials In this experiment, five differently shaped foam wings were mounted in a wind tunnel. The different designs are: a flat wing, a wing with a curved upper surface and a concave lower surface, a wing with an upper surface curved down and a convex lower surface, a wing with a curved upper surface and a flat base, and a wing with a flat upper surface and a convex base. Each wing is mounted onto one end of a balance scale within the wind tunnel. Counter weights are added to the other side to balance the scale. When the fan is turned on, the wing moves up or down based on how the wind interacts with the wing shape. The wing with the most counterweights removed (negative numeric results) will have the best lift.	
Results The wing with a curved upper surface and a flat base had the best lift of -0.37N (negative indicated countering the force of gravity). The second to best wing had a lift of -0.34N; it has a curved upper surface and a concave lower surface. The flat wing's average was -0.11N, while the wing with an upper surface curved down and a convex lower surface had the exact opposite, +0.11N. The wing with the worst results is the wing with a flat upper surface and a convex base; its result average was +0.13N.	
Conclusions/Discussion The data supports my hypothesis that a wing with a flat base and a surface curved upward will generate the best lift force. The shape of a wing can greatly affect and impact the flight of a plane.	
Summary Statement The goal was to establish what airfoil shape produced the most lift, it was discovered that when a wing has a curved upper surface, it will generate a lift force as it moves through the air to counter act the force of gravity.	
Help Received Dad helped build wind tunnel, assisted with testing, and hepled understand the concept of lift; Mom helped review the board.	