



**CALIFORNIA STATE SCIENCE FAIR  
2004 PROJECT SUMMARY**

<b>Name(s)</b> Nick J. Bertero	<b>Project Number</b> <b>J0199</b>
<b>Project Title</b> <b>The Effects of Wing Angle and Angle of Attack on Flight Duration</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The goals for this experiment were to find out which wing angle produced the most amount of lift when launched from 3 different angles of attack, 0, 5 and 10 degrees. There were 3 different wing angles, 3, 20 and 50 degrees.</p> <p><b>Methods/Materials</b> After the planes were modified they were launched from the launch board 12 times from 3 different angles, 0, 5, and 10 degrees, representing different angle of attacks. Every time the planes were launched, they were timed to the hundredth of a second and measured to the nearest 0 or 5 hundredths.</p> <p><b>Results</b> Alpha, the 3-degree plane, generated the most amount of lift in the shortest amount of time. Alpha created enough lift to start a loop, but did not generate enough speed to finish the loop. The 20-degree plane, Bravo, generated enough lift and speed to complete loops. After the loop was completed, enough speed would be left so Bravo could glide for several more seconds. Delta, the 50-degree plane, generated the least amount of lift but created the greatest amount of speed. The launch board occasionally snagged Delta, indicating that Delta was on the board all the way until the board ended. It was able to usually fly straight because it never did a loop or glide so the wind could not affect it.</p> <p><b>Conclusions/Discussion</b> The smaller the wing angle, the more lift is generated, and the greater the wing angle, the more speed will be generated, though some amount of lift will be lost. Alpha created the most amount of lift in the shortest amount of time, even though not enough speed was created to complete the loop. The wing angle for Alpha is best used on small planes because it can generate enough lift with a smaller engine. Bravo created a balance of lift and speed. It was generally able to complete one loop, and glided for several seconds after the loop was completed. Because of the balance of lift and speed, Bravo is best used for commercial airline flights. Delta was the fastest plane and always traveled in a straight line. Since it generated the least lift, it needs to have high speeds in order to fly. This wing angle is perfect for fighters in the air force because those planes can generate the speed needed to keep them aloft.</p>	
<b>Summary Statement</b> I timed how long a different wing angle would stay in the air when launched at three different angles.	
<b>Help Received</b> Professor Drela from MIT told me that I should focus on flight duration. Grandfather helped cut and shave the wings, and helped to conduct the experiment. Father timed the flight duration and measure the distance the planes had flown	