



**CALIFORNIA STATE SCIENCE FAIR  
2005 PROJECT SUMMARY**

<b>Name(s)</b> <b>Bill Greenwald; Jordan Sayyah</b>	<b>Project Number</b> <b>J1598</b>
<b>Project Title</b> <b>May the Force Be With You</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Our First Goal was to picture the shape of the field around an electromagnet. Our Second Goal was to measure the strength of the force field near a pole of the electromagnet. We hypothesized that modifying certain features of an electromagnet would affect the force field.</p> <p><b>Methods/Materials</b> We tested the strength of the electromagnet by comparing the weight of a metal disk when the electromagnet was on or off. We tested these features: distance from the disk, magnet core, number of coils of wire, and amount of current (I). We graphed the disk's change of weight in these experiments to see if any mathematical rules applied.</p> <p><b>Results</b> An electromagnet generates greater force with: more current (I), more coils, a closer distance, and a ferromagnetic core.</p> <p><b>Conclusions/Discussion</b> Our initial hypothesis was qualitatively correct but quantitatively incorrect. We found this by graphing the results of our experiments. For example: when you have three times the current the force triples, but if you get three times as close, the force is nine times as great. By understanding the physics of electromagnets, one can predict how an electromagnet will work. By understanding how electromagnets work you can use them to create new inventions in today's technology.</p>	
<b>Summary Statement</b> The goal of our project was to derive the mathematical equation for the magnetic field at the pole of an electromagnet.	
<b>Help Received</b> Bill's dad helped type part of the report, helped with set up for the experiments, and also helped us conduct the experiments.	