



**CALIFORNIA STATE SCIENCE FAIR
2008 PROJECT SUMMARY**

Name(s) Azwad A. Sabik	Project Number S0814
Project Title Fascinating Fields of Flux	
Abstract Objectives/Goals The objective of my project was to determine which of the following variables most greatly affected the strength of an electromagnet: the number of coils, the voltage of the power source, the diameter of the core, and the gauge of the wire. I hypothesized that the number of coils wrapped around the core of an electromagnet would most greatly affect its strength. Methods/Materials The materials I used in my experiment were: different gauges of insulated copper wire, batteries of various voltages, steel bolts with different diameters, an index card, a few alligator clips, and staples. I made an electromagnet by wrapping the copper wire around a bolt and connecting the wire to one or more batteries with alligator clips. This produced a magnetic field around the bolt and wire. I measured the strength of the magnetic field by measuring the distance at which the bolt could pull a staple across the flat surface of an index card to one of its ends. I did four sets of experiments. During each set, I changed only one of the variables and kept the others constant throughout the experiments. This allowed for observation of only the effect of changing that specific variable. Results I observed that increasing the number of coils, the voltage of power source, the diameter of the core, and the thickness of the wire (the higher the gauge, the lower the thickness), all resulted in an increase of the magnetic fields strength. When comparing ratios between the changes in the results of each test and the changes in the factors for those same tests, I observed that increasing the number of coils of wire around the core increased the strength more than the other variables did. Conclusions/Discussion Therefore, I concluded that within the scope of my testing environment and procedure, the number of coils surrounding an electromagnet most greatly affected its strength. This validated my hypothesis.	
Summary Statement The purpose of my project was to determine which of a set of factors most greatly affected strength of an electromagnet.	
Help Received Science teacher helped with research; father helped conduct experiment.	