



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Ezra J. Graber	Project Number J0911
Project Title Electromagnets: Is Bigger Better?	
Objectives/Goals My objective was to see which size drillstock would produce the strongest electromagnet.	
Abstract Methods/Materials I used six drillstock cores with three different sizes. The sizes were 5/16#, 3/8#, and 1/2#. Out of those sizes, one from each size had thirty wraps of 22 gauge wire, and on my other three sizes, I had sixty wraps of 22 gauge wire. I then hooked them up to my battery pack which held six volts. For my experiment I put each electromagnet into a container of scientific metal filings the same way each time and held it in there for two seconds to the count of "one thousand and one, one thousand and two.". I would do that five times for each electromagnet and then weigh how much filings it held on a triple beam balance scale.	
Results My data was confusing. For the 30 wraps series, (Chart A), A1 was inconsistent and had a wide range of measurements. B1 started out strong, but became weaker. C1 showed the most consistent data. For the 60 wrap series, (Chart B), A2 was strong and got stronger. B2 was moderately strong. C2 was the strongest overall. When I took the averages, (Chart C), the data showed that the biggest core, 1/2 inches, with sixty wraps was the strongest electromagnet. However, the smaller core with sixty wraps was the next strongest on this chart. I then found out that drillstock can easily become a permanent magnet. At the end of my experiment, only the smaller cores were still being magnetized. So I think the data for the larger cores were true.	
Conclusions/Discussion Bigger is better because the largest magnet with sixty wraps did the best out of all the electromagnets. But the smallest core on Chart C did better than the medium. I think that was because the magnets were still being magnetized which made them stronger. If I did this again, I would try using a single D cell battery in hopes of avoiding magnetization of the drillstock.	
Summary Statement Controlling the variables to test the strength of an electromagnet.	
Help Received Mother helped with photographs.	