



# CALIFORNIA STATE SCIENCE FAIR 2002 PROJECT SUMMARY

<b>Name(s)</b> <b>Robert G. Wright</b>	<b>Project Number</b> <b>J0727</b>
<b>Project Title</b> <b>Making a Stronger Electromagnet</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Objective: The objective of my experiment was to determine how certain variables affect the strength of the magnetic field of an electromagnet. I tested the variables of electrical power (voltage and amperage), wire gauge, number of wire wrappings, and rod width.</p> <p><b>Methods/Materials</b> Materials and Methods: An electromagnet and a crane structure to hold it, with the electromagnet hanging downwards. A platform that can rise very slowly and can stop and hold its position. The object to be lifted by the electromagnet, a ball bearing, sits in a hole in the platform. Relative magnetic power of the electromagnet is determined by raising the ball bearing on the platform under the electromagnet. When the ball bearing gets lifted off of the platform, it is stopped from raising any further. Measure the distance from the top of the platform to the end of the electromagnet rod. Conduct five tests, each one testing a different variable.</p> <p><b>Results</b> Results: In the Voltage Test, the strength of the magnetic field increased as the voltage increased, but the increase was small compared to the large increase in voltage. The amperage increased slightly when I added more batteries. It seemed that the increase in amperage was causing the increase in the strength of the magnetic field. In the Amperage Test, the strength of the magnetic field increased more than in the Voltage Test because the amperage affects the electromagnet more than the voltage. The increase seemed to be a logarithmic curve. As the amperage went up, the strength of the magnetic field did not change proportionally as much. In the Wrap Test, the strength of the magnetic field increased as the number of wraps increased. It seemed as if concentrating the wraps at the end of the rod increased the magnetic field. In the Wire Size Test, changing the wire gauge did not substantially affect the strength of the magnetic field when the number of wraps was the same, or the length of wraps was the same. In the Rod Width Test, a wider rod would increase the strength of the magnetic field.</p> <p><b>Conclusions/Discussion</b> Conclusions: Increasing the electrical current (amperage), increasing the number of wire wrappings, or increasing the rod width makes the magnetic field of an electromagnet stronger. Changing the gauge of the wire did not substantially affect the strength of the magnetic field.</p>	
<b>Summary Statement</b> Determine how the variables of electric power, wire gauge, number of wire wrappings, and rod width effect the strength of the magnetic field of an electromagnet.	
<b>Help Received</b> Father provided some assistance in building the electromagnet and conducting the tests.	