



**CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY**

Name(s) Ryan H. Henze	Project Number J1514
Project Title Use the Force	
Objectives/Goals How does the diameter, length, and material of a magnet affect its attraction?	
Abstract	
Methods/Materials 8 ceramic magnet 1" diameter x 1/4" 4 ceramic magnet 1/2" diameter x 1/4" 1 neodymium iron boron magnet 1/2" diameter x 1/4" 1 neodymium iron boron magnet 1" diameter x 1/4" 1 brass screw 20 threads per inch particle board 4" x 1/2" x 8" 4" x 1/2" x 4" 1 steel 1/4" diameter 1 aluminum plate 4" x 1" x 1/4" wood screws to assemble 1/4" 20 thread iron filings 3 sheets of graph paper 1 sheet of cardboard saran wrap	
Results The length and diameter of the magnet can change the magnetic field lines and the material of the magnet can change the number of magnetic lines of flux.	
Conclusions/Discussion A way of comparing the magnetic field strength of different magnet types and sizes is to compare the attractive force with another magnetic object. This experiment used a steel ball and measured the distance between the magnet and the ball where the field applied a force greater than the weight of the ball and pulled the ball to the magnet. In this experiment I learned that some magnetic materials are stronger than others and neodymium iron boron magnets are much more powerful than ceramic magnets. The data in Figure 2 shows increasing either the diameter or the length of a magnet attracts the ball from further away which means the magnet has a stronger magnetic field. This agreed with my hypothesis. I thought increasing a magnet's length would keep increasing its magnetic attraction, but the data in Figure 2 showed this increase gets smaller as the magnet gets longer.	
Summary Statement My project is about finding how the diameter, length, and material of a magnet can affect its attraction.	
Help Received I had help with three different things in this science project. For the experimental apparatus I had help sawing and drilling holes and holding the apparatus stable. I had help finding information as well. My dad helped me find information that would allow me to make my project better.	