



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> Chester H. Charlton	<b>Project Number</b> <b>J1804</b>
<b>Project Title</b> <b>The Dissipation of Magnetic Force through Steel Bars</b>	
<b>Abstract</b>	
<b>Objectives/Goals</b> My objective in this experiment was to develop an equation for the amount of magnetic pulling force that would travel through a steel bar if a magnet is placed on one end.	
<b>Methods/Materials</b> Materials: In this experiment I used various materials: 1.Plank of wood; 2.Permanent magnet 0.5 in by 0.5 in(NFeB); 3.Iron bars with lengths 2cm-24cm (annealed); 4.Wooden bench; 5.Lab notebook; 6.Electronic scale (Measures up to 10 kg); 7.Spring scale (measures up to 40 pounds); 8.Wooden clamp.  Procedure: 1.Attach correct length of bar #1 to the wooden clamp; 2.Attach permanent magnet to the top of bar #1; 3.Attach container to bar #2 and bar #2 to bar #1; 4.Empty container (everything is attached and not in motion); 5.Start adding water; 6.Once the container drops, weigh the container (filled) and bar #2; 7.Enter data into lab notebook.	
<b>Results</b> The results showed that the longer the bar was, the less the magnet attraction force increased or decreased. I fit an equation to the data that was a quadratic equation, not an exponential. However an exponential equation would seem more logical since it will not increase after the vertex.	
<b>Conclusions/Discussion</b> The data did support my hypothesis. The equation was a polynomial, not exponential. I think that my tests (after perfection of the method) were fairly accurate since the average deviation was 0.995. If this experiment were to be repeated, I would use rods (circular) instead of bars so that the bars wouldn't hang on edge. I learned in this experiment a formula for the relation of magnetic force to length. I also learned to view magnetic waves as lines that get farther spread apart the farther you are away from the magnet.	
<b>Summary Statement</b> The formula for the amount of magnetic force able to travel through an iron bar (a magnet on one end of the bar).	
<b>Help Received</b> My father helped craft the wooden clamp.	