



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

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Project Title Power of Shields: How Different Materials Affect Magnetic Fields	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Magnetic shielding does not allow magnetic fields to interact. Magnetic shielding is used daily in televisions, microwaves, and cell phones. The better the magnetic shield the closer magnetic objects can be without any interference. Magnetic shields used to reroute magnetic forces are described by their permeability and saturation. Materials that have a high permeability are better magnetic shields. If a material is used to redirect a magnetic field, then the material with more iron in it will be a better shield.</p> <p>Methods/Materials Ferromagnetic, diamagnetic, and paramagnetic materials are used as the dependent variables to attempt to shield the magnetic force. Steel is the only ferromagnetic material. Copper is the diamagnetic material. Plywood, plastic, and aluminum are the paramagnetic materials used. Air, or no magnetic shield, is used as the control.</p> <p>Results The distance that the magnetic field is felt after shielding with each material is the dependent variable. This is measured in centimeters by the distance from the magnet that a paper clip can stay suspended in the air. The controlled variables are the neodymium earth magnet that emits the magnetic field, the distance of the shield from the magnet, the orientation of the shields, and the paper clip used to determine the magnetic force. The thickest steel sheet, 0.025 inches, reduced the magnetic field by 2.7 centimeters.</p> <p>Conclusions/Discussion Steel, a ferromagnetic material with a high iron content and high permeability, worked best as a magnetic shield.</p>	
Summary Statement What material will shield a magnetic field the best?	
Help Received My dad helped be build the apparatus to measure the magnetic field.	