



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2018 PROJECT SUMMARY**

<b>Name(s)</b> <b>Aliya Earley</b>	<b>Project Number</b> <b>S1806</b>
<b>Project Title</b> <b>Which Magnet Type Performs Most Consistently across All Temperature Environments?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this project was to determine which magnet type performs most consistently across a variety of temperature environments.</p> <p><b>Methods/Materials</b> Tested the performance of four magnet types in five different temperature environments. The temperature environments were achieved using an oven, steamer compartment, room at room temperature, freezer, and a cooler of dry ice. The performance of each magnet was measured using three tests: the first weighed the number of paper clips a magnet could lift, the second measured the distance at which a magnet attracted one paper clip, the third measured the amount of force needed to pull the magnet off of a steel plate. Each magnet type was tested five times at each temperature.</p> <p><b>Results</b> Alnico magnets were least affected by temperature, while samarium magnets performed slightly less consistently, but still favorably. Ceramic magnets were visibly unstable when temperatures changed, and neodymium were the most affected overall, weakening dramatically when exposed to extreme temperatures.</p> <p><b>Conclusions/Discussion</b> If a situation requires the most consistent magnet available, alnico is the best choice. However, alnico magnets also seem to be the weakest of the four magnets, so samarium may be a good option if magnets need to be relatively powerful but still stable in varying temperatures. The results of this experiment are relevant in the design of machinery (involving magnets) which must withstand both extreme cold and extreme warmth. Combined with other factors, such as the overall strength of each magnet type, this data can be helpful in determining the most efficient magnet for an application.</p>	
<b>Summary Statement</b> This experiment shows that out of four magnet types tested, alnico and samarium magnets perform most consistently across a wide range of temperatures.	
<b>Help Received</b> My father helped acquire materials and assisted in the testing process. Bob Fabini (retired science teacher at my High School) gave advice on presentation of project procedure and results.	