



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

<b>Name(s)</b> <b>Thomas W. Maxfield</b>	<b>Project Number</b> <b>J0918</b>
<b>Project Title</b> <b>Exploring Magnetic Levitation</b>	
<b>Abstract</b> <b>Objectives/Goals</b> Two magnets can attract or repel depending on orientation of their poles. I wanted to measure the repulsion forces of two magnets and find how it depends on the separation between the two magnets. My hypothesis is that the repulsion force of the two magnets is inversely proportional to the square of the separation, just like gravity. <b>Methods/Materials</b> In order to do this I set up an apparatus where two magnetic sources repel each other. One of the sources stayed stationary at the base while I dropped a single neodymium magnet along a wooden guide from the top. The magnet's poles were the same polarity, so they repelled each other to the point where the top magnet stayed stationary as the acceleration due to gravity and the repulsion force was equal. I changed the amount of mass added to the top magnet in 50g nonmagnetic weight increments and measured the distance between the two surfaces. <b>Results</b> I plotted my results on a graph and added a trend line, which corresponds to the equation where the magnetic force is inversely proportional to the square of the separation of the two magnets. I have done this for different numbers of base magnets and weights added to the levitating magnet, and always got the results that followed this trend. <b>Conclusions/Discussion</b> This supports my hypothesis that the magnetic force is inversely proportional to the square of the separation of the magnets. Understanding of magnetic levitation can be used in designing future transportation systems, such as levitating trains, or mass drivers to launch cargo in space.	
<b>Summary Statement</b> My project is about understanding how the repulsive magnetic force that can be used to levitate a magnet above another one depends on their separation.	
<b>Help Received</b> My teacher, Mrs. Newman, helped me find some online sources and references about how to design and construct an experiment, and how to write a report.	