



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Daniel P. Ridley	Project Number 36393
Project Title What Gauge of Magnet Wire Makes Paper Speakers the Loudest?	
Objectives/Goals The purpose of this project is to find if a change in the diameter (gauge) of the wire used in the electromagnetic coils, located in speakers, made a difference in sound output. Abstract Methods/Materials Cut two strips of paper about the width of the magnet. Then wrap the strip of paper tightly around the magnets. Next, take the second strip and wrap it around the first. After, slide the stack of magnets and the inner tube out of each other. Then put the magnets inside the large tube and start wrapping one of the 4 gauges of wire neatly around the tube. When you are done wrapping, glue the coil of wire in the center of the plate. Next fold 2 business cards in a #M# shape. Glue the business cards onto the plate on each side of the coil. Attach another plate on the free end of the business cards to act as a base. Afterwards, strip the enamel coating off of the free ends of the coil's wires. Finally, connect your speaker to the amplifier and turn it on. Results I found that the thinner gauge wire worked better in building a paper speaker. The two thinner gauges gained almost 20 decibels in some cases! I also noticed the two larger and the two smaller thicknesses of the wire seemed to have similar results between themselves. The smaller diameters of magnet wire consistently proved to output more sound than the larger gauges of wire. Conclusions/Discussion My hypothesis proved to be correct, a smaller gauge wire did actually perform better in a paper speaker. The larger gauge wire was about 11 decibels quieter in comparison with the smaller gauge wire. The gap in loudness was lessened when the higher frequency tones were tested. I believe this is because the cone (the plate in this case) didn't have to move very far to create a high tone. I think the thicker wire couldn't transfer as much energy to the magnets because of how they had to overlap each winding. The smaller gauges of wire also sounded better in general. To strengthen my findings and improve this project, I could test more gauges of wire and use more precise ways of measuring the sound output of the paper speakers.	
Summary Statement This project tests what thickness of magnet wire makes home-made speakers the loudest.	
Help Received	