



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Matthew Cho	Project Number J1304
Project Title A Study of a Graphite Line's Electrical Conductivity	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My goal is to see if graphite lines on paper conduct electricity. Also, if it does, how do the length, height (the number of times you draw over the line), and the grades of graphite affect the conductivity? My hypothesis is that the graphite lines on paper will conduct electricity and the length, height, and the grade of graphite line will affect the conductivity.</p> <p>Methods/Materials In this experiment, I used a HB, 4H, 2H, 2B, 4B pencil, piano, musical tuner, cardboard paper, ruler, and a Drawdio Kit. 1) Make the Drawdio Kit(a toy that makes different sounds based on electrical conductivity) . 2)Make the Note Grading scale: On a piano keyboard picture, give a point to each key on the piano from the lowest to highest sound. 3) Length Test: Draw an 11 cm line and mark the 3cm, 6cm, and 9cm points. Listen to the sound each point makes using the Drawdio Kit. Find the notes of these 3 marks using the piano and tuner. Give scores for each note a line makes. 4) Height Test: Draw three 6cm lines that have been drawn over 5 times, 15 times and 30 times each. Listen to the sound each line makes and find the notes for all the lines. Give scores for each note a line makes. 5)Pencil Grade Test: Draw 7 cm lines for each pencil grade with the 4H, 2H, HB, 2B, and 4B pencils. Listen to the sound each line makes and find the notes for all the lines. Give a score for each note a line makes.</p> <p>Results The graphite lines on the paper conducted electricity and made sounds when I used the Drawdio Kit. In the length tests, the shortest line had the highest points. In the height tests, the line with the highest height had the highest points. In the grades of graphite tests, the lines made with softer and bolder graphite had higher points.</p> <p>Conclusions/Discussion The graphite lines on paper conduct electricity. Also, the length, height, and the grade of the graphite line affect the conductivity. The length tests show that the shorter the line was, the better the conductivity was. I believe this was due to the larger amount of resistance encountered over a longer distance. In the height test, the higher the height was, the better the conductivity was.I believe this is because of the small particles that come off from the pencil are more condensed when a line has a high height. In the grades of graphite tests, the higher the softness and boldness was, the better the conductivity was. This is probably because the graphite does not mark easily if the pencil is hard but if it is soft and bold, the graphite will mark easily and provide a stronger connection.</p>	
Summary Statement Does the length, height, and the grade of graphite affect the electrical conductivity of a graphite line?	
Help Received Father helped me assemble the PCB.	