



**CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY**

Name(s) Krishna Lian D. Tuazon	Project Number 36263
Project Title Simplest Electromagnetic Train	
Abstract Objectives/Goals My project was to determine if a neodymium magnet, battery and a copper wire are capable of creating a high source of magnetic field resulting in constant motion making it the world's simplest electric train. The number and set-up of a magnet, voltage of a battery and a uniform winding of a copper wire into a coil all have its effect in generating movement of the train testifying its speed producing an increase strength of magnetic field. I believe this new mode of transportation will help the environment, make faster transactions, and bring convenience to people. This is the future! Methods/Materials To create my train, I put neodymium magnets on each side of the battery. Magnets used were classed in between N35s-N52s. Magnets on either end of the battery should have their North poles pointing in opposite directions. Three different sizes of alkaline battery were tested to establish average performances. Wrapped the copper wire clockwise in tight smooth coils and made a big long train track. I constructed 3 different spaces of winding the copper wire coils and determine which spacing works best and runs faster. Push the newly created train into the copper wire and watch it travel through the wire. Results I was able to create my train using N52 neodymium magnets. A stack of four magnets, a 1/2 diameter and 1/8 inch thickness on each end of the battery. I used a half-size AAA battery and 1.5 V alkaline AAA battery. Winding the tracks coil tightly, the train will fly around so fast, however, winding the coil loops too far apart and the train will run slow. A bare copper wire wounded about 20-24 turns per inch has the greater speed as I tested and determined the optimum turns per inch by speed in seconds. Conclusions/Discussion I learned that a battery, neodymium magnets and a copper wire are capable of creating the world's simplest train. Adding more magnets to the battery, the more winding the wire into a coil, the stronger the magnetic field produced and the higher the induced energy resulting in greater speed. This project would have to go into a bigger scale and this design would be a great advancement in terms of modern and efficient mode of transportation.	
Summary Statement My project is about creating the simplest electromagnetic train.	
Help Received Mother helped me put together my display board, conduct my testing and type my report. Father helped with building the model.	