CALIFORNIA STATE SCIENCE FAIR
2003 PROJECT SUMMARY

Name(s)
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Project Number
J0221

Project Title
Maglev Trains

Abstract

Objectives/Goals
Hypothesis:
Magnetic levitated trains are more efficient with top magnet support instead of from the bottom

Methods/Materials
To test our hypothesis, we followed the standard steps on the scientific method. We designed an experimental model which included miniature magnetic trains with magnetic support from top and from bottom. Then we included speed, tilt angle, and payload capacity, as variables to compare. We did 15 experiments for each type of train, and we did analysis of the data found in our experiments.
Materials
We used: Neodymium magnets, ferrite magnets, cedar wood, silicone, Krazy-glue, plastic spacers, Plexiglas, electric tape, paint, plastic tube, metal screws, a saw, sand paper, an stop watch and markers for color the model trains.

Results
In our experiment we found that in the three variables top magnetic support was faster by 0.75 seconds, 0 degrees tilted (2 degrees for bottom supported), and the payload was the same for both (10 grams.)

Conclusions/Discussion
Conclusion
Based on the result of our experiment, we concluded that the hypothesis was true
Discussion
We found that the center of gravity was lower in the model with support from top, therefore the train is more manageable and the gravity force acts in the lower part of the train as stabilizer. We also conclude that the length of the train has a direct impact on the levitation and on the horizontal traveling, because: The shorter the train the more unstable, to the point that the magnetic force from the rail can turn upside down the train, and the longer the train the shorter the inertia. For our model, we found that 2½to 3 inches was the optimal train size, and probably is a recommended proportional size for a live size magnetic train in the USA.

Summary Statement
We suggest for the magnetic trains in the USA to consider magnetic support from top and use the gravity force as stabilizer for easier control.

Help Received
Dad helped with power tools, mom helped with typing and driving