CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
Harrison J. Cameron

Project Number
J0106

Project Title
3D Printed Rocket Science

Abstract

Objectives/Goals
I wanted to see how different 3-D printed rockets would fly in linear distance. I also was trying to see why the rockets we use today fly so well. My hypothesis is that the 4 finned rockets with the normal fin design and a longer nose cone would fly the furthest out of the 8 rockets that I had designed.

Methods/Materials
I used my dads 3-D printer to print out 8 rockets we designed using CAD software. We had two nose cone designs and 3 fin designs, each using either 3 or 4 fins. I then went to a park and launched each rocket 3 times using a launcher that my dad and I built. Then I found the center of pressure and center of gravity for each rocket before adding a 0.8 gram weight to the tip of the nose cone. After which I launched each rocket 3 times again and found the center of pressure and center of gravity for each one of the rockets. We recorded each launch using a high speed camera and scale to calculate release velocities.

Results
The rockets with longer nose cones went 30% further than the blunt nose cone rockets. The rocket with the 3 long bodied fins went about a quarter of the length compared to its 4 fin design and the rockets with other fin designs. The wide finned rockets flew about the same as the normal shaped fins. Once I added weight to the rockets, the long nose cones rockets still went about 30% further and all the fin designs showed significant improvement. Even the long bodied 3 fin rocket flew about the same as the others. The high speed camera showed that all of rockets launched at an average of 41m/s with or without the added weight.

Conclusions/Discussion
I learned a lot about the factors that make a rocket fly the best. I learned how the center of gravity has to be ahead of the center of pressure in order for a rocket to remain stable while flying. I also learned how rockets with a more aerodynamic design can cut through the air better.

Summary Statement
Using 3-D printed rockets I showed that an aerodynamic nose cone and moving the center of gravity ahead of the center of pressure is more important for rocket stability and flight performance than the number of fins or their shape.

Help Received
My dad helped me design, print, and launch the rockets and my mom helped me cut things out on my poster board.