



CALIFORNIA STATE SCIENCE FAIR 2006 PROJECT SUMMARY

Name(s) Sophia Cooper; Nisha Husain; Haley Zarrin	Project Number J0108
Project Title Effect of Fins on Water Rocket Stability	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To see what effects water rocket stability while the rocket is flying. Fins, weight, air pressure, and water-to-air ratio were examined in 3 ways: 1) using a rocket simulator from the Internet, 2) using a homemade wind tunnel, and 3) launching 76 water rockets.</p> <p>Methods/Materials First, we used an Internet water rocket simulator to launch 57, 0.5-liter water rockets. We changed the amount of water for 20 trials. Then we changed the air pressure for 20 trials. We also experimented with different gravitational forces. We determined the optimal amount of water for maximum speed and height from this experiment. Second, we used a homemade wind tunnel to find the effect of the number of fins on a rocket's stability. We hung rockets with different numbers of fins in the wind tunnel and videotaped their movement from underneath each rocket. Then we analyzed the videotape frame-by-frame and recorded the effect of the number of fins on a rocket's stability under constant airflow. Third, we built 22 water rockets with different numbers of fins. We launched the rockets a total of 76 times and videotaped each launch. We placed a 4.87- meter reference pole in the background of the launch field. The videotape was analyzed frame-by-frame. The reference pole in the background was used to determine the maximum speed and height of each rocket. The tape also recorded the travel pattern of each rocket.</p> <p>Results</p> <ul style="list-style-type: none">- Rockets with 50% water reached maximum velocity.- With 50% water and 50% air, there is just enough air and water to push the rocket straight up to maximum height.- 95.4% of rockets with higher velocity remained on flight path.- Number of fins of rockets did not affect the rocket stability.- Rockets with 90 PSI air pressure traveled 12m/s faster than those with 15 PSI air pressure.- Fins have no effect at low velocity near maximum height. <p>Conclusions/Discussion Fins are an important ingredient in building rockets. Because fins give rockets stability, it is important to understand the effect of fins on rocket stability. From our experimenting, we found that fins are more effective at higher velocities, and when a rocket is filled with 50% water and 50% air.</p>	
Summary Statement The central focus of our project is to find the effect of fins on rocket stability.	
Help Received Mr. Simon Zarrin helped with the dangerous elements of our project (ei. hot glue gun, pressurizing rocket with air.)	