



# CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

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<b>Project Title</b> <b>3... 2.. 1... Liftoff!</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The following report is an attempt to find the relationship between the volume of water and launch altitude for a 2 liter soda bottle rocket under controlled conditions: (1) 1 atm and 25 °C (surroundings to system, the experiment), (2) fixed position of observers and launcher, (3) fixed angle, length, and diameter of launch tube, (4) a pressure of 50 PSI, and (5) water temperature of 25°C for each launch.</p> <p><b>Methods/Materials</b> Under controlled conditions of (1) 1 atm and 25 °C (surroundings to system, the experiment), (2) fixed position of observers and launcher, (3) fixed angle, length, and diameter of launch tube, (4) a pressure of 50 PSI, and (5) water temperature of 25°C for each launch, the experiment carried out consisted of launching a bottle several times, each time with a specific volume of water, in increments of 100mL. The launcher used to launch the bottles was constructed of an air compressor, PVC pipes, a trigger mechanism, a Schrader valve, and a fixed central launch shaft. One person launched the rocket, and another person (observer) measured the angle of the ground to the person to the maximum height of the launched bottle. The person who launched the rocket then measured the perimeter of the imaginary triangle consisting of the points of the launcher to the observer to the final position of the launched bottle. Using trigonometric equations and angle measurement, an approximate altitude is calculated for each test. From the data collected, the relationship between the volume of water and launch altitude is graphed on a plane for the analysis.</p> <p><b>Results</b> The relationship, when graphed on a plane, shows a skewed curve with an elongated end towards the extreme high end of the volume of water. The maximum altitude, 39.49 meters, was achieved with 300 milliliters of water. Before the 300 milliliter mark, there is an increasing trend for the relationship of water added to altitude reached. After the 300 milliliter mark, there is a decreasing trend for the relationship of water added to altitude reached.</p> <p><b>Conclusions/Discussion</b> Within a range of 0-300 milliliters, the altitude reached by the rocket increases with more water added. After 300 milliliters, the altitude reached by the rocket decreases with more water added.</p>	
<b>Summary Statement</b> Finding the Relationship Between the Volume of Water and Launch Altitude for a 2-Liter Soda Bottle Rocket	
<b>Help Received</b> Mother helped with measurements of distances of rocket to launcher to observer; Johnny helped cut PVC pipes and design for construction of the launcher	