



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>Katherine C. Stephens-Doll</b>	<b>Project Number</b> <b>J1538</b>
<b>Project Title</b> <b>The Effect of Differentiating Droplet Size on Rainbow Brilliance</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The reason that this project was chosen above others was because my dad and I were sorting through books to look for a project, and we came upon an entry on Prisms and Light. The diagrams of the reflective patterns of light interested me. I had lots of questions about Rainbows, so I decided that that would be a perfect area of investigation. The overall purpose of this project was to find if a certain characteristic of water (drop size) would effect the rainbow, and if so, how. I believed that the bigger the droplets, the more water would be available to reflect in and that would make more diverse and detailed patterns.</p> <p><b>Methods/Materials</b> I could take the size of a solid object that you could measure, and compare it then I would be able to infer the size of the water droplet. One characteristic that both objects shared was their shadows. If I could magnify the shadows from the objects, I could measure them more accurately. I built an instrument that measured everything I needed to know, and therefore cross-multiplied and found the size of the drop. Then I had to take several different sized drops measured on my instruments and saw how far they spread out on filter paper. Now that I know an accurate measurement of my droplets, To figure out an accurate measurement of the droplet#s brightness, I decided to use the computer program #Photo Impact# to find individual pixel intensity.</p> <p><b>Results</b> I found that my control drops were: Control Drop #1 was 49.02,Control Drop #3 was 36.58, and Control Drop #4 was 25.65. For my shower wand i got 3.89mm, and for the mist nozzle i got 2.01mm. For four different spots in the rainbow, red, blue, and green#s (primary colors of light) levels of intensity were found. By adding up the average of each color, and then finding the average of the three colors, we get a total average of intensity for each rainbow. The intensity for the Shower wand was 181.6 and the intensity for the mist nozzle was 159.0 (255 = full sun).</p> <p><b>Conclusions/Discussion</b> My final results supported my hypothesis. It seemed that the best results (181.6) were found in the shower wand, which had many droplets, and the brightest rainbow. The fog (lower mark, 159) was the smallest nozzle, and the dimmer light, supporting my hypotheses. I found that all of my variable work (see original abstract) made my project much more accurate. I then did more research to attempt to further support the hypothesis.</p>	
<b>Summary Statement</b> If larger or smaller droplets create a more vivid array of colors in a rainbow.	
<b>Help Received</b> Father helped with math; Mother helped get information on fair guidelines.	