



**CALIFORNIA SCIENCE & ENGINEERING FAIR
2018 PROJECT SUMMARY**

Name(s) John Bailey; Bobby Ikeda	Project Number 38075
Project Title Density Fluctuation Relative to Temperature	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This experiment is to test how temperature affects the density of various liquids through a measure of buoyancy. We predict that while most liquids have a predictable rate of increased density at lower temperature that water is an anomaly having its greatest measure of density just prior to the point of freezing.</p> <p>Methods/Materials A freezer, ice, and salt to cool and super-cool the liquids. A stove, pan, and Pyrex container to heat and hold heated liquids. A plastic vessel, coins, paperclips, thermometer, and scale to conduct measurements.</p> <p>Results The hypothesis for water was supported by our data, and there was a peak at 4 degrees Celsius, but the hypothesis for the other liquids was only partially supported. Although the density was always higher at 0 degrees Celsius than at 65 degrees Celsius the measurements of density tended to fluctuate along the temperature scale.</p> <p>Conclusions/Discussion Our data showed that there was an anomaly with the density of water relative to temperature that was inconsistent with other liquids. We feel that inconsistencies in the data in regards to the other liquids was primarily due to our inability to precisely and consistently control the conditions of the experiment. Understanding the anomaly in water density has implications to engineering, as well as, maritime travel and commerce.</p>	
Summary Statement We tried to demonstrate that while most liquids have a predictable rate of increased density at lower temperature that water is an anomaly having its greatest measure of density at 4 degrees C. prior to the point of freezing.	
Help Received We received general advice from our GATE teachers and from my father who assisted in controlling the temperatures during the experiment.	