



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Rodrigo J. Plaza	Project Number J1532
Project Title Sink or Swim: The Effects of Temperature on Liquid Density and Buoyancy	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine the effects of liquid temperature on the density of the liquid and the buoyancy of an object in the liquid.</p> <p>Methods/Materials Four different liquids: tap water, vinegar, canola oil and sugar-water, were each examined at three different temperatures: 5, 25 and 75 degrees Celsius. The mass and volume of each liquid at each temperature were determined using a digital balance and a graduated cylinder, and the densities of each calculated. Then, buoyancy was measured for each liquid at each temperature using a hydrometer. Each data point was repeated three times and an average taken for each. Averages were graphed and trends were examined.</p> <p>Results As temperature increased, liquid density decreased for all liquids. This decrease in liquid density resulted in a decrease in the buoyancy of the hydrometer in the liquid (the hydrometer rested lower in the liquid at higher temperatures). The most extreme differences in temperature effects on buoyancy were seen with the sugar-water (the most dense liquid) and the canola oil (the least dense liquid), while the vinegar and tap water had smaller effects.</p> <p>Conclusions/Discussion As liquid temperature increased, liquid density decreased, making objects floating in the liquid less buoyant, as I had hypothesized. Although differences seen were not very large, the trends were followed for all liquids. The larger changes in buoyancy for sugar-water and canola oil may have been due to their greater viscosity than the other two liquids. The effects of temperature on buoyancy are important to take into account when designing a buoyant object such as a boat, floating bridge, or life vest.</p>	
Summary Statement This project demonstrates the relationships between liquid temperature, liquid density and the buoyancy of objects in liquid by determining the differences in the density of, and hydrometer buoyancy in, liquids at different temperatures.	
Help Received Mother helped type report and used lab equipment borrowed from Cabrillo Community College under mother's supervision (a chemistry teacher); general project guidance by 8th grade science teacher, Ms. Kilkenny.	