



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Nicole Madrazo	Project Number J0609
Project Title Just a Needle and a Lot of Surface Tension	
Abstract Objectives/Goals The objective of this experiment was to determine if surface tension of water is affected by temperature. Methods/Materials For this experiment 10 containers were used that had different temperatures of water in them. I poured the water into another shallow bowl under a balance made from two tin cans and a wood rod with a needle as the fulcrum. To balance the beam, I used a small amount of modeling clay. A paper basket tied with eight inches of string was attached to one end of the wooden rod. I put pieces of small paperclips in this basket to allow me to measure the surface tension and a triple-beam balance scale to measure the mass of them. On the other side, four inches of nylon string held a needle which rested on the surface of the water. The different temperatures of water were measured with a digital thermometer in degrees Celsius. I heated or cooled ½ cup of water. After measuring the temperature, I put the water into the shallow bowl and rested the needle gently on top of it. Using tweezers, I gently put the small pieces of paper clips into the paper basket until the needle lifted off the surface of the water. Then I measured the mass of the pieces of paperclip. Then using the formula $F=2sd$ (s =surface tension, d =length of the needle resting on the water, and $F=$ (mass of paperclips) $\times(9.83)\times(10^{-3})$ to make it N/g). I repeated did this 10 times for each different temperature. Results 10 trials were taken for five different temperatures of the water. Each trial was measured in grams. I recorded the results in a table and calculated the surface tension with the formula $F=2sd$ where s is the surface tension, d is the length of the needle resting on the water and F is the mass of the paper clips \times the gravitational pull of the earth $\times 10^{-3}$. Surface tension is expressed in Newtons/m. The results demonstrate that as the temperature of the water increases the surface tension decreases and creates a somewhat linear graph. Conclusions/Discussion My hypothesis was proven correct when I discovered that the higher the temperature gets, the lower the surface tension is. There are various examples of surface tension in real life. Temperature plays a big roll in the behavior of a liquid. When the liquid is stretched by something or is poured on a surface, it tends to form the droplets due to the surface tension.	
Summary Statement My project tests the effect of temperature on the surfaace tension of water.	
Help Received Mother took me to the store to buy materials and organization; Father helpeld build balance; Aunt lend me her thermometer; Teacher gave me ideas on project	