



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

Name(s) Bryon E. Scott	Project Number J1520
Project Title Stressed Out Chocolate	
Abstract Objectives/Goals My goal was to determine if the temperature to which chocolate is heated will affect its strength after hardening. Methods/Materials Real milk, dark and white chocolates were each heated, in a double boiler, to eight different temperatures. Three temperatures were below, two were at and three others were above, the recommended chocolate tempering range. After reaching the appropriate temperature, which was checked with a candy thermometer, the chocolate was cooled in an ice bath then reheated to the recommended temperatures used in the chocolate tempering process. Plastic candy bar molds were each filled with forty grams of melted chocolate and placed in the freezer to harden for 10 minutes. After being unmolded the chocolate was allowed to sit at room temperature for 24 hours. Each chocolate bar was then placed on a modified 3 point bend test machine to determine how many grams were required to break it. A mathematical formula was used to figure the force/stress necessary to break the chocolate. Results Milk and dark chocolate were strongest when heated in the recommended temper range. White chocolate was strongest right below and in the bottom range of the recommended temper range. The further away the temperature was from the recommended temper range the weaker the chocolate became. Conclusions/Discussion The results showed that my hypothesis was correct. The closer to the recommended temper range the chocolate was heated to, the stronger it was. The temperature to which chocolate is heated did have an effect on the strength of the chocolate after it hardened. The strength of chocolate is important because of the consumer market. Stronger chocolate is more durable and better able to take the punishments of shipping and handling.	
Summary Statement The focus of this project was to determine if the temperature to which chocolate is heated has an affect on its strength after hardening.	
Help Received My father helped me build my 3 point bend test machine. My mother helped me with the layout of my board.	