



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

Name(s) Samuel Girvin	Project Number J1299
Project Title Chocolate Tempering	
Objectives/Goals When tempering, what mix of temperatures (recommended-recommended, higher-higher, higher-recommended) creates the highest temper in chocolate?	
Abstract Methods/Materials Clear your workspace, clean all of the chocolate molds, fill the bottom pan of the double boiler with water, allow this water to simmer, and place upper pan over lower pan. Place 1 lb. of chocolate in top pan. Checking with the thermometer, bring the chocolates temperature to 120°. Take top pan off and allow chocolate to cool to 75°, starting to stir after the chocolate reaches 105°. Immediately heat chocolate back up to 89°, taking caution not to heat the chocolate beyond. Maintain 89°. Using the syringe, pour 12 ccs of chocolate into each of three molds. Repeat steps using the rest of the chocolate unpoured plus another ½ lb, 125° instead of 120° and 94° instead of 89°. This is temperature set higher-higher. Repeat steps again using another ½ lb. of chocolate, 125° instead of 120°, and keeping 89° (higher-recommended), and then remelt the chocolate and pour 12 ccs into three cups (control). Test properties. Two lbs. Semisweet Chocolate, Double Boiler, Water, Digital Thermometer, Stove, 12 Identical Molds, 12 cc Syringe, Metric Scale, Sheen Chart, Clamp	
Results The Recommended-Recommended combination provided the highest temper in all categories, followed by Higher-Recommended, which had the second-highest temper. Higher-Higher had the third-best temper in most categories, but in snapping strength the Control Group had better results. The Control Group had the worst temper except in strength.	
Conclusions/Discussion My hypothesis was wrong. The average recommended-recommended actually had the highest values in all test areas, instead of the higher-recommended that I had predicted. Higher-recommended came in second, but was lower than recommended-recommended in all categories. This surprised me in that I expected it to be first, or at least very close to it. The temperature difference between higher-recommended and recommended-recommended should only have served to more thoroughly melt the fat crystals in the higher-recommended chocolate, according to my research. This suggests to me that there is another property that melting at temperatures higher than 120° causes that creates unstable crystals. Higher-higher did have the worst temper of the three. All three had better tempers than the control, which was melted and cooled.	
Summary Statement My project is about tempering chocolate to manipulate its properties, showing whether or not my instructions are optimized	
Help Received Mother helped hold instruments; Father provided books and raw materials	