



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

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Project Title Sunny Money: Weighing Variables in Solar Water Heating Systems to Improve Cost-Effectiveness	
Abstract Objectives/Goals Modern society needs alternative energy. Solar water heating systems (SWHS) can provide 8-18% of a home's energy usage. To aid SWHS, this study will determine how much each variable (insulation, color, and the presence and type of a metal conductor) affects the rate and amount that water heats. This in turn will improve the cost-effectiveness of SWHS. Insulation is expected to make the most effect and metal grid the least. The white grids were hypothesized to have a negative effect because of their color. Methods/Materials Two methods were performed, each twice, on four different mornings during which several pans, with adjustments that represented the variables, were measured for temperature for several hours. Each method examined pan color and mesh color, while the first tested mesh spacing and the second insulation. Results Insulation made an average of 0.90°C effect in Method #2 Test #2 and color 3.03°C. Grids' trends were inconsistent and difference from control was seldom over one degree, often arbitrarily dipping below the control, and within the experimental uncertainty. Conclusions/Discussion As expected, color and insulation had significant positive effects. However, contrary to the hypothesis, color made a larger and more distinct effect than insulation. Despite extensive testing, the grids' results were inconclusive, being within the experimental uncertainty. Future experimentation includes retesting the mesh, this time the variable being amount in the belief that mesh eventually affects heating.	
Summary Statement My project investigates which of the variables in solar water heating systems -insulation, color, or metal-absorbs the most heat energy from solar radiation by building and testing models.	
Help Received My teacher, Mrs. Acres, helped with the report, and my father acted as an advisor.	