



CALIFORNIA STATE SCIENCE FAIR 2010 PROJECT SUMMARY

Name(s) David G. Mariscal	Project Number J1021
Project Title Using Passive Solar Design to Cool and Heat a House	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My project is about passive solar design, and how it uses the sun position in the sky during winter and summer, to heat and cool a building without an A.C. or heater. For this project I conducted a series of four experiments that simulate the sun position during summer and winter. The purpose of these experiments is to demonstrate how a model home using passive solar design can collect heat during the winter and reject heat during the summer. Because they rely on the sun, a renewable resource, passive solar homes and buildings can lower their energy bills and greatly reduce green house gases that contribute to global warming.</p> <p>Methods/Materials I determined the sun position for summer(68 degrees)and winter(22 degrees)at latitude 45 degrees. I made a cardboard triangle to help position a heat lamp(the sun)and measure how far away to place the model house. For Experiments 1 and 2(summer cooling)I used a heat lamp at 68 degrees and marked the temperature in and out of the model home at 30 second intervals for 5 minutes. For Experiment 2, I placed two trees in front of model house. For Experiments 3 and 4(winter heating)I used a heat lamp at 22 degrees and marked the temperature at 30 second intervals for 5 minutes. I turned off the heat lamp and measured the temperature at 30 second intervals for another 5 minutes. For Experiment 4, I used a clear glass dish with 4 ounces of water as a thermal mass storage device.</p> <p>Results Experiments 1 and 2 showed that a home using passive solar design can reject heat during summer. I was surprised by the temperature differences between the inside of the house compared to the outside during the summer especially with shady trees. Experiments 3 and 4 showed that a home using passive solar design can retain heat during winter. The thermal mass storage made a difference in storing the heat and keeping the inside temperature even for a longer period of time.</p> <p>Conclusions/Discussion I believe my project proves that passive solar design can reduce energy demands for winter heating and summer cooling. The best part about using the sun for heating and cooling buildings is that solar energy is free. Buildings that use passive solar design can cut their energy bills significantly. By using less electricity to run air conditioners or natural gas to fire furnaces, passive solar design can also help reduce green house gas emissions and global warming.</p>	
Summary Statement My project is about passive solar design, and how it uses the sun's position in the sky during winter and summer, to heat and cool a building without an A.C. or heater.	
Help Received My father helped me build the model house, My mother advised me on the design of the board.	