



**CALIFORNIA SCIENCE & ENGINEERING FAIR  
2018 PROJECT SUMMARY**

<b>Name(s)</b> <b>Isabella J. Catanzaro</b>	<b>Project Number</b> <b>S1804</b>
<b>Project Title</b> <b>Heat Transfer Optimization for Home Insulation</b>	
<b>Abstract</b> <b>Objectives/Goals</b> I became interested in learning about conduction, convection, and radiation in order to reduce the amount of energy to keep my house a comfortable temperature. If I reduce the emissivity of drywall inside the walls of my house, the walls insulate better and keep the inside of my house a comfortable temperature. <b>Methods/Materials</b> I created simulations in C# code of walls in various temperature regimes and found limiting radiation would limit the amount of heat transferred into the house. I then tested these results with an experiment consisting of a mock-up of a wall. I created three mock-up walls: a control with drywall, an experimental configuration with the interior faces of drywall painted silver, and an experimental configuration with aluminum foil laminated on the interior faces. <b>Results</b> The drywall that was laminated with aluminum foil had an R-value that was a factor of 2.6903 greater than the uncoated drywall and drywall coated with silver paint had an R-value that was a factor of 1.66 greater than uncoated drywall. In addition, the drywall laminated with aluminum was as insulating as pink fiberglass insulation. <b>Conclusions/Discussion</b> By making the drywall have a low emissivity, I was able to reduce the amount of heat transferred through the wall resulting in a more insulating wall. By reducing the amount of heat able to transfer through the wall it becomes easier to keep the inside room a stable temperature.	
<b>Summary Statement</b> By studying radiation, convection, and conduction from the interior to the exterior of a house, I designed and tested an improved method of insulating wall.	
<b>Help Received</b> I designed, built, programmed, and performed the experiments myself. I used both the internet and textbooks on heat transfer to more fully understand the necessary calculations.	