



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

<b>Name(s)</b> <b>Tyler J. Bodenhamer</b>	<b>Project Number</b> <b>J1404</b>
<b>Project Title</b> <b>Building a Solar Air Heater: A Study to Determine Efficiency of Various Solar Absorber Materials</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective of this project is to build and simultaneously test multiple solar air heaters that use different absorber materials and then to determine the design that will be the most efficient in cost and performance. <b>Methods/Materials</b> I built four identical collector boxes out of wood, insulation, and with a plexi-glass cover. Each box was filled with a different type of absorber material including aluminum soda cans, steel downspouts, insect screening, and aluminum sheeting. I also pre-determined the best soda can absorber design by testing soda can towers that had the ends cut open in four unique ways. Air temperature, air flow, and cost data was collected. <b>Results</b> The four solar air heaters were analyzed by the net heat raised, the air flow, and the construction costs. The soda can absorber, with the ends cut completely open, outperformed the other absorber materials in both cost and average degree Celsius raised of heat output on both days tested. <b>Conclusions/Discussion</b> The soda cans were the most efficient solar absorber because they performed the best at generating the highest average air temperatures for the lowest total cost. These results are significant because the absorber comparisons were done with the same exact collector box size, the same area of solar exposure, and under the same weather conditions. These finding can be used as a base to continue to improve the design and construction of do-it-yourself solar air heaters that are efficient and inexpensive to make.	
<b>Summary Statement</b> Four identical solar air heaters were built and tested to compare the efficiency of different solar absorber materials as determined by their performance, air flow rate, and total construction costs.	
<b>Help Received</b> I built and tested the solar air heaters myself after research online. I borrowed digital thermometers from Mr Bridges, my science teacher, and an air flow meter from Benny Sy, a mechanical engineer.	