



Solar Cookers and Easy Data



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PURPOSE: To create the greatest temperature change in a hot-dog exclusively using solar power.

LEARNING OBJECTIVES: To investigate radiation, conduction, convection, and thermal mass via scientific inquiry using a TI-84 and Easy Data application.

PROCEDURE:

1. The students were shown plans to a very simple solar cooker that made use of a cardboard pizza box.
2. The students were encouraged to design a solar cooker that would increase the temperature of a hot dog to the highest temperature in 30 minutes. Bonus points were awarded for first, second, & third place.
3. Students attached an Easy Temp probe to a TI-84 calculator. The calculator automatically began providing live temperature readings by reading the Easy Data application for the students. Students easily changed the “settings” to record temperature readings for 30 minutes.
4. The Easy Temp probe was inserted lengthwise into the center of the hot dog. The solar ovens, along with the calculators, and probes were allowed to run for 30 minutes outside as we went back to the classroom to discuss radiation, conduction, and convection.
5. At the end of the class period, students saved their data on the calculator. The next day, the results were loaded into Graphical Analysis where a “hard copy” of the temperature/time graph could be generated. Each graph was taped to the respective solar oven.
6. Students were asked why they thought particular ovens were more “efficient cookers” than others. The concepts of radiation, conduction, convection, insulation, and thermal mass were woven into the discussion.

RESULTS: Results varied based on the intensity of the sunlight and the quality of the solar cooker.

PRECAUTIONS: If an oven performed poorly during this activity, hot dogs were chosen because they are a processed food that could be eaten safely cold. Some students tried to place the temperature probe outside of the hot dog to graph the temperature change of the air rather than the hot dog. The thermal “inertia” of the air is substantially less than the hot dog, giving those students a distinct advantage. The teachers needs to be sure student follow the rules of the competition.

