

# Spring Challenge 2024- Solar Ovens

## In-Person Competition at Pacific – May 25th

**LEVEL:** Middle School / High School

**DIVISION(S):** 6<sup>th</sup>, 7<sup>th</sup>/8<sup>th</sup>, 9<sup>th</sup>/10<sup>th</sup>, 11<sup>th</sup>/12<sup>th</sup>

**COMPOSITION OF TEAM:** 2-3

### **OVERVIEW:**

Solar cooking is the simplest, safest, most convenient way to cook food without consuming fuels or heating up the kitchen. For hundreds of millions of people around the world who cook over fires fueled by wood or dung, and who walk miles to collect firewood or spend much of their meager incomes on fuel, solar cooking is a clean, economical alternative.

Additionally for millions of people who lack access to safe drinking water and become sick or die each year from preventable waterborne illnesses, solar water pasteurization is a life-saving skill. The World Health Organization reports that in 23 countries 10% of deaths are due to just two environmental risk factors: unsafe water, including poor sanitation and hygiene; and household air pollution due to solid fuel use for cooking.

With this in mind, each contestant will construct a solar oven, harnessing the natural energy of the sun to heat water to the highest temperature possible in an efficient manner.

### **MATERIALS:**

Materials are limited to the following. Any additional materials not on this list will result in a disqualification.

- Cardboard (any kind)
- Aluminum foil
- Plastic wrap
- Tape
- Black paper or black paint
- Thermometer (for testing)
- Mason jar (for testing)
- Glue or hot glue

### **GENERAL RULES:**

1. The students' full name, grade level and school name must be clearly labeled on the solar oven.
2. All parts of the solar oven must fit into a 60 cm by 60 cm by 60 cm cube. No parts including any extendable hoods/levers may extend beyond the allocated space during inspection or during competition.

3. The oven must be able to support an 8 oz mason jar filled in with 150 mL of water.
4. When placed in the solar cooker the jar must be fully supported and stable. Spilled water, unstable jars, and lack of support will lead to disqualification.
5. Judges will designate Solar Zone predetermined before the competition, where the participants will be instructed to position their solar ovens. Teams may position their solar oven in ANY orientation, as long as it stays WITHIN the Solar Zone.
6. Digital media (e.g., photos, video recordings, etc.) will not be accepted for arbitration purposes.

## **JUDGING:**

Teams will check in at the WPC Lawn.

1. Teams will be given a team number label sticker at check in.
2. Solar ovens will be weighed at check-in.
3. Judges will inspect solar ovens at check in to check size, materials and stability specifications. Disqualified teams cannot place.
4. Teams will be taken to the solar zone to leave their oven for impound while they participate in the scavenger hunt. This area will be monitored.

**Teams MUST return to the Solar Oven area no later than 11am.** If teams participating in the scavenger hunt didn't get a snow cone yet, the solar judges will stamp their cards so they can get their snow cones during the 25 minute testing period.

5. Testing will be staggered by grade divisions – 6<sup>th</sup> Grade, 7<sup>th</sup>/8<sup>th</sup> Grade, 9<sup>th</sup>/10<sup>th</sup> Grade, and 11<sup>th</sup>/12<sup>th</sup> Grade
6. Teams will collect a pre-filled mason jar with a lid from the judging table.
7. Before the competition timer starts, teams can set up their solar cooker within the solar zone wherever they would like.
8. Students **must** remove the metal lid from the jar before putting into the cooker.
9. When the competition lead says START each team will place their mason jar within their solar cooker.
10. After 25 minutes the competition lead will say "<grade level> STOP". All mason jars must be removed at that time. Failure to remove jar when STOP has been called may result in disqualification.
11. Teams must stick their team number on the front of their mason jar and bring them to the judging area for their temperatures to be measured.
12. Judges will insert their temperature probes in the jar and measure the water temperature until a stable water temperature has been reached. The temperature will be recorded to the nearest half degree in Fahrenheit.
13. Judges will record the temperature in their judging rubric.

14. Judges will submit all their top three winning teams' temperature and solar oven weight for each grade level group.
15. The highest temperature will determine the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> place winners. Winning teams will be announced after all scores are recorded.
16. Because temperatures will be rounded to the nearest half degree, ties are likely. Ties will be broken by the weight of the oven, with the LIGHTER the oven the better.

**SCORE RECORD BY TEAM:**

Team Name:

Solar Cooker Weight	Solar Cooker Temperature
<i>(Tie breaker) The less weight the better</i>	<i>The higher the temperature the better</i>
Weight in Grams:	Temp in Fahrenheit: