**Carson Graham Science & Engineering STEM Challenge**

**SOLAR OVEN COOK-OFF!**

**Team members: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Your challenge is to use science to **research, design**, and **build** a working SOLAR OVEN that uses energy from the sun to heat and cook food!

**CRITERIA FOR SUCCESS**

* Your group built a working solar oven!
* Your group can explain the science behind your solar oven
  + *(reflection/refraction/absorption, lenses/mirrors, light waves/rays, EM spectrum…)*
* **Prize** for Hottest Temperature Achieved! (*measured with temperature gun*)
* **Prize** for Best Cooked Food! (*determined by teacher judges! Must de precooked and safe!)*

**STEPS:**

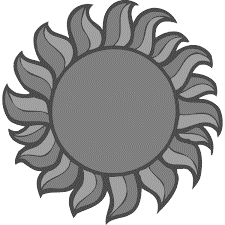
1. Form groups and brainstorm ideas!
2. **INQUIRY QUESTION**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. **RESEARCH** solar ovens options (*cite sources in APA*)
4. Work to fill the below poster as you go:

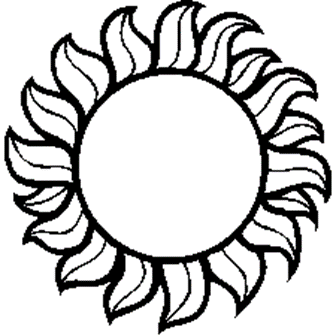
***Divide your poster paper into four sections:***

|  |  |
| --- | --- |
| **RESEARCH**   * Your Inquiry Question! * Sketches of possible types of solar ovens * Ideas, brainstorming, plans * Record your references in APA | **MATHMATICAL THINKING**   * Include any math needed in your oven! * Formulas to find area? * Temperature conversions? * Measurements? |
| **SCIENCE CONCEPTS of your SOLAR OVEN**   * Light Rays/mirrors/lenses? * Reflection/refraction/absorption? * Light Waves/EM Spectrum? * Other science….? | **YOUR ENGINEERING DRAWING**  **of your SOLAR OVEN Design (iteration 1)**   * Dimensions * Materials * Angles and other info… |

1. Produce detailed **DESIGN (iteration 1)** 
   1. You will need to seek out your own **materials** that you require.

*(Think about cardboard, tape, paint, etc…)*

1. Get **feedback** and reflect – check in with teacher *(initials: \_\_\_\_\_)*
2. Produce detailed **DESIGN (iteration 2)**
3. **BUILD** **solar oven (version 1)**
4. **Test** solar oven and refine
5. **IMPROVE** **solar oven (version 2)**
6. Continue to **test** and refine your solar oven, until…
7. **COOK DAY!!!** A sunny day in late May/early June
   1. All groups test their ovens at the same time out on the field!
   2. Record data (quantitative and qualitative)
8. **REFLECT** on your results:
   1. D*escribe your results and what happened*
   2. *Describe the science of your solar oven*
   3. *What problems did your solar oven have? Why?*
   4. *What improvements and extensions could you do?*

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**WHAT TO HAND IN:**

* **A power point/google SLIDE SHOW documenting your project.**

* + Must include:
    - Photos of your research poster paper (4 quadrants)
    - Documented sources
    - Photos of your solar oven and progress through the project
    - Your results and reflections!

**ASSESSMENT**

**Criterion D: Reflecting on the impacts of science**

|  |  |  |
| --- | --- | --- |
| **Level** | **Level descriptor** (*official*) | **Task specific rubric** (*solar oven*) |
| 0 | The student **does not** reach a standard described by any of the descriptors below | The student **does not** reach a standard described by any of the descriptors below |
| 1-2 | * **state** the ways in which science is used to address a specific problem or issue * **state** the implications of using science and its application to solve a specific problem or issue, interacting with a factor * **apply** scientific language to communicate understanding but does so **with limited success** * document sources**, with limited success** | * **state** the ways in which science is used to cook food in a solar oven * **state** the implications of using science and its application to design and build a working solar oven, interacting with mirrors and lenses * **apply** scientific language to communicate understanding of light, but does so **with limited success** * document sources in APA format (both in-text and in a reference list)**, with limited success** |
| 3-4 | * **outline** the ways in which science is used to address a specific problem or issue * **outline** the implications of using science and its application to solve a specific problem or issue, interacting with a factor * **sometimes apply** scientific language to communicate understanding * **usually** document sources **correctly** | * **outline** the ways in which science is used to cook food in a solar oven * **outline** the implications of using science and its application to design and build a working solar oven, interacting with mirrors and lenses * **sometimes apply** scientific language to communicate understanding of light * **usually** document sourcesin APA format (both in-text and in a reference list) **correctly** |
| 5-6 | * **summarize** the ways in which science is used to address a specific problem or issue * **describe** the implications of using science and its application to solve a specific problem or issue, interacting with a factor * **usually apply** scientific language to communicate understanding **clearly and precisely** * **usually** document sources **correctly** | * **summarize** the ways in which science is used to cook food in a solar oven * **describe** the implications of using science and its application to design and build a working solar oven, interacting with mirrors and lenses **usually apply** scientific language to communicate understanding of light **clearly and precisely** * **usually** document sources in APA format (both in-text and in a reference list) **correctly** |
| 7-8 | * **describe** the ways in which science is used to address a specific problem or issue * **discuss** and **analyze** the implications of using science and its application to solve a specific problem or issue, interacting with a factor * **consistently apply** scientific language to communicate understanding **clearly and precisely** * document sources **completely** | * **describe** the ways in which science is used to cook food in a solar oven * **discuss** and **analyze** the implications of using science and its application to design and build a working solar oven, interacting with mirrors and lenses * **consistently apply** scientific language to communicate understanding of light **clearly and precisely** * document sourcesin APA format (both in-text and in a reference list) **completely** |

**Describe:** Give a detailed account or picture of a situation, event, pattern or process

**Outline:** Give a brief account

**Discuss:** Offer a considered and balanced review that includes a range of arguments, factors or hypotheses. Opinions or conclusions should be presented clearly and supported by appropriate evidence

**Evaluate:** Make an appraisal by weighing the strengths and limitations

**Factors**: social, economic, political, environmental, ethical, moral,

**Summarize:** Abstract a general theme or major point(s)

**State:** Give a specific name, value or other brief answer without explanation or calculation

**Analyze:** breakdown in order to bring out essential elements of structure. (To identify parts and relationships and to interpret information and reach conclusions)