



## Engineering Design Mission Folder Score Range – 201-300

### Team Collaboration

**How was your team formed? Was your team assigned or did you choose to work with each other?**

Our team was formed by our teacher telling us who our group members were. We also all go to the same school.

**Provide a detailed description of each team member's responsibilities and jobs during your work on the Mission Folder.**

All of us have responsibilities and things we have to do to be successful. We have to bring our materials and do our questions in the Mission Folder.

**Did your team face any problems working together? If so, how did you solve them? If not, why do you think you were able to work together so well?**

No real problems happened while we were working on this project because we are all friends and did our responsibilities. Also, no problems happened with our responsibilities.

**What were some possible advantages to working together as a team on this project? How would working as individuals have made this project more difficult?**

If we weren't working together in a group and had to work by ourselves, then everybody would have more responsibilities and things in the Mission Folder to do. Working in a group, you don't have to bring more materials for the project. Also some people aren't that smart so having maybe a smart person can help you out.

### Use of Engineering Design

**What problem in your community will your team attempt to solve using the engineering design process?**

In our community, regularly cooking a hotdog with a microwave or oven uses a lot of gasoline. When you cook a hot dog with solar panels, it doesn't pollute the environment.



**Research your problem. You must learn more about the problem you are trying to solve and also what possible solutions already exist. Find AT LEAST 10 different resources and list them here. They should include books, periodicals (magazines, journals, etc.), websites, experts, and any other resources you can think of. Be specific when listing them, and do not list your search engine (Google, etc.) as a resource.**

<https://www.education.com/science-fair/article/solar-hot-dog-cooker/>

<https://www.seia.org/initiatives/about-solar-energy>

<https://science.howstuffworks.com/environmental/green-science/solar-cooking1.htm>

<https://www.howcast.com/videos/425764-how-to-make-a-solar-hot-dog-cooker>

<http://lsa.colorado.edu/essence/texts/solar.html>

**Explain what you learned from your research. What did you find out about your problem that you didn't know before? What kinds of possible solutions already exist? Be sure to put this in your OWN words, do not just copy and paste information. Also, be sure to cite your sources.**

I learned from my research lots of things about solar panels and how to use them to cook a hot dog. I learned that I didn't know before that solar panels had barely polluted the environment and it was helpful to lots of people. Also solar panels don't cost all that much and they are easy to use.

**What MUST be a part of your solution? This is called the criteria. What does your solution need to have in order to solve the problem? (NOTE: Don't discuss a specific solution here, just the characteristics of a good solution).**

To have a good solution, you need to have good and credible research sources so you know you are solving the problem correctly. Secondly, you need good materials that will actually work and that will contribute to the solution. Lastly, you need good partners and enough time to test out a solution so you can see if it will solve the problem, and test out different solutions.

**What limits are there on your solution? These are called constraints. Does it need to be a certain size? A certain weight? Is the cost a factor? Write down all of the limits on your solution.**

The solar cooker has few constraints because it can be made almost entirely out of recycled items, which doesn't make it expensive. The only constraint that our group really had was trying to find an oversized shoebox. We couldn't find one that was empty or not in use, so we used a normal sized shoebox.

**Based on your criteria and constraints, what is your proposed solution to the problem you chose? Explain what it will look like and how it will work. If you can, include a detailed, labeled drawing.**

For the problem of pollution from grills, ovens, and microwaves, our solution will be a solar cooker that can cook a hot dog. The cooker will be cut into a semi-circle shape and made out of a shoebox. It will include tin foil to reflect the sun's rays onto the hot dog, which will be on a wire to hold it.



**How will you test your solution? The BEST way to test your solution is to build a working model or a prototype that you can actually use. Or you can guess how your solution will work BASED ON your research. Which method will you use and why?**

Our group will build a working model/prototype so we can test out and see if we can actually cook a hot dog with solar power. Another reason is because we want to test it out ourselves and be absolutely sure it works or not instead of just guessing.

**If you built a prototype or model, explain how you built your prototype or model, step-by-step including all safety precautions. If you guessed how your solution would work BASED ON your research, explain important information from your research that you used to prove how your solution would work and be sure to cite your sources.**

To build the model, we first did math to find out the focus of the parabola. This helped us to know the measurements of the semi-circle to cut out of the box. Next, we cut out a piece of a poster board and covered it in tinfoil to fit in the box. After this, we built supports to hold the wire that holds the hot dog. Lastly, we placed the cooker in the sun and waited for the hot dog to cook. To be safe while building this project, we got adult supervision when cutting things out.

**Explain how you tested your prototype or model. Be sure to include every step of your testing including all safety precautions that were taken. If not stated it will be assumed no safety precautions were taken. If you are using research to guess how your solution will work, explain step-by-step how it will work and why.**

To test our model, we first placed it in the sun with an adult's help so no one else would mess with it. We waited for the hot dog to start cooking, and when it started to sizzle and cook, we flipped it over to cook the other side. The group continued this process over and over again until the hot dog was thoroughly cooked. When it was finished, we took the hot dog off the hot wire with the adult's help so we didn't burn ourselves. We placed the hot dog into a bun, and one group member took a bite to see if it was completely cooked, and it was.

**What problems did you find with your solution? Be specific since you will need to redesign based on these problems.**

Solar panels are trying to take care of natural gas and coal.

**Describe all of the changes you made to your prototype or model (or proposed prototype) after your first test. Why will these changes improve your solution?**

Our proto type had no flaws so we made no changes.

**Present the data you collected from your tests or from your research. If you tested a prototype or model then include all of the numbers you gathered during your testing and all observations you made. Use of graphs and charts is HIGHLY encouraged. If you used research to prove how your solution would work, be sure to include all of the numbers, charts, and graphs you used to make your case.**

Our bata could not be collected but the hotdog tasted good and perfectly cooked.



**What are your potential sources of error? Remember, this doesn't mean "Did everything work?", all tests have potential sources of error, so make sure you understand what that means. Explain how these sources of error could have affected your results.**

We could have used better materials and higher quality materials.

**What conclusions can you draw based on the data you gathered during your tests?**

This project should be used immediately.

## **Benefit to the Community**

**Explain how investigating the problem your team chose will help the community. Be sure to include the impacts your research will have on individuals, businesses, organizations, and the environment in your community (if any). Make it very clear why solving this problem would help your community.**

The problem of pollution made global warming a real problem and also solar panels don't impact the environment at all because all of the energy comes from the sun. The research helped by telling us solar panels are so much more helpful than gas products.

## **Abstract**

The project was to make a solar-powered machine that could cook a hot dog, that isn't using gas. We used solar panels and lots of different materials to cook a hot dog. The reason of the project was to try to improve the environment and not pollute. Solar panels don't pollute/impact the environment nearly as much as coal or gas would. The group used science to use/build the solar panels and use them and the sun to cook a hot dog. The group used technology to use solar panels and heat the hot dog. The group used engineering by recycling and used resources that people would usually throw away to cook a hot dog. The group used math to calculate how long it took to cook.

## Attachments

File #: 1

Title Solar Hot Dog Cooker

Description The finished solar hot dog cooker.



File #: 2

Title Solar Hot Dog Cooker

Description Gluing the cut tinfoil to the poster board to put into the box.



File #: 3

Title Solar Hot Dog Cooker

Description Using math to figure out the measurements for the box shape.



File #: 4

Title Solar Hot Dog Cooker

Description The box put together without the cooking wire and hot dog.

