



## SOLAR EGG COOKER

Your Mission: To cook a single egg using only solar power and a device of your own design and manufacture using only recycled materials.

### The Rules

- 1) No purchased apparatus or materials.
- 2) All materials must be second use. In other words, if you use aluminum foil, it must have been previously used for some other purpose. You are welcomed and encouraged to use a wide variety of materials around the house, but you should not need to go and buy materials for this activity. Be inventive and creative with the materials at home.

### Materials

- household items for building solar cooker as indicated above
- two thermometers (Celsius)

### Notes

- There are many designs for homemade solar cookers available on the internet. However, not all of them are effective designs. If you would like a resource to help you get started, go to <http://solarcooking.org/plans/funnel.htm>. As an additional activity, you might want to build your own design, build a design you find on the web, and then compare results.
- DO NOT eat your egg.
- Safety reminders:
  - 1) If you are fortunate, parts of your device may become hot.
  - 2) Handle your device with caution.
  - 3) If your device uses materials with sharp edges (glass, mirrors), handle your device with caution.
  - 4) During cooking, it may be necessary to keep your device away from children and pets.

### Procedure

- 1) Construct a solar cooking device to cook an egg. It will be your choice to break the egg or leave it in its shell. Be sure to design the device so that it can hold the egg properly.
- 2) On a completely clear day you will need to set up your device in a location where it can receive full sunlight for a minimum of 4 hours (6 hours is best, from 9 am until 3 pm.) If it is windy, but sure to stabilize it or use rocks to hold it down.
- 3) Place one thermometer on the device in the direct sunlight. Place the other thermometer in the device so that it is in the white of the egg. If you decide to cook the egg in the shell, use a nail to tap a small hole in the shell and insert the thermometer.
- 4) Collect surface temperature and egg temperature data every 15 minutes for 6 hours.
- 5) Complete the data chart on the next page
- 6) Complete the analysis chart on the next page.
- 7) Graph as instructed.
- 8) Answer the conclusion questions that follow.

## DATA CHART

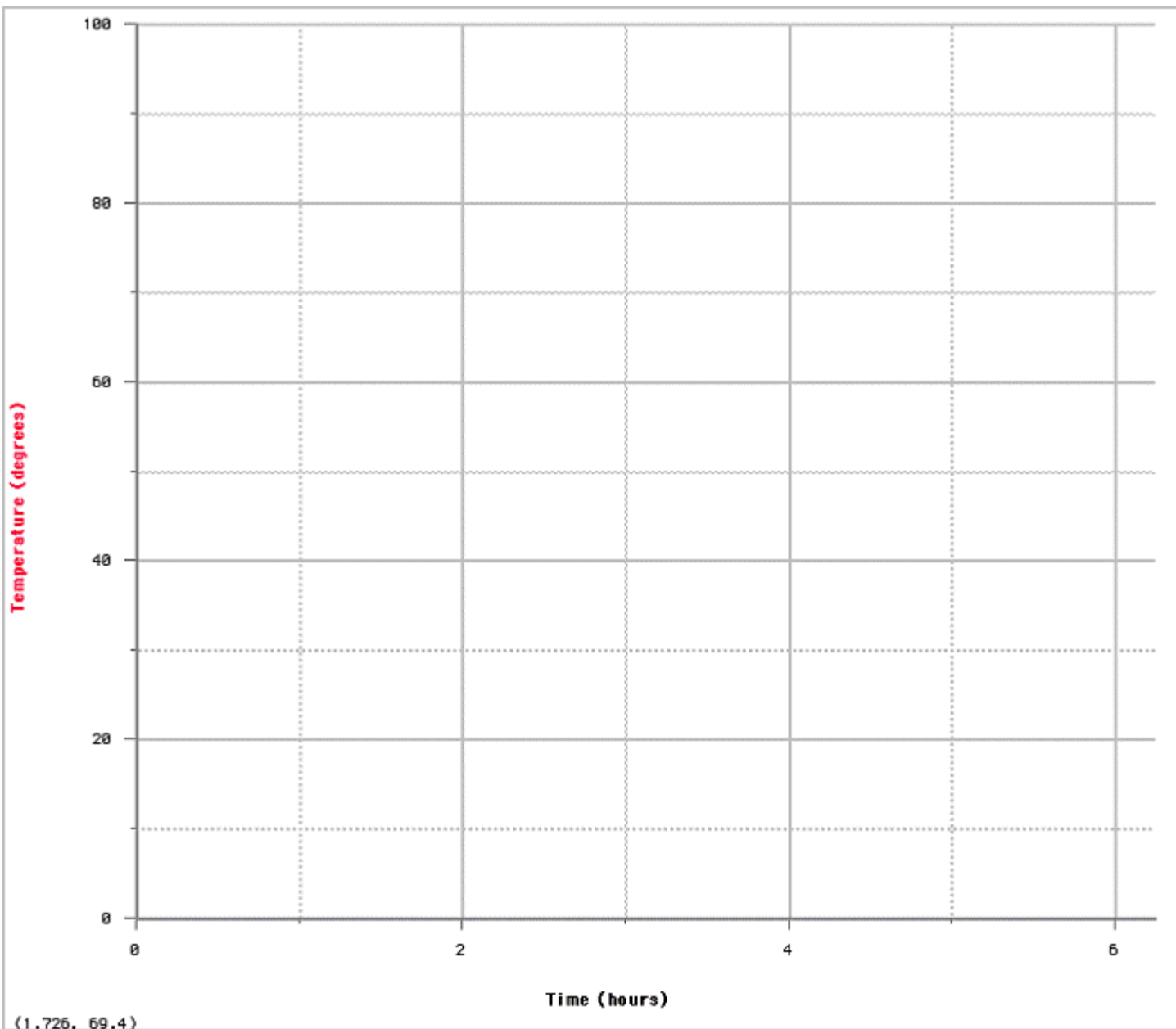
TIME (hours)	Surface Temp (degrees C)	Egg Temp (degrees C)
0		
0.25		
0.5		
0.75		
1 hour		
1.25		
1.5		
1.75		
2 hours		
2.25		
2.5		
2.75		
3 hours		
3.25		
3.5		
3.75		
4 hours		
4.25		
4.5		
4.75		
5 hours		
5.25		
5.5		
5.75		
6 hours		

### Analysis Chart

	Surface	Egg
Starting Temperature (degrees)		
Maximum Temperature (degrees)		
Temperature Change (degrees)		
Temperature Change/ hour (degrees/hr)		

### Graph (Time vs Temperature in degrees Celsius)

- Use the graph paper below to plot your data.
- Plot surface temperature in one color and egg temperature in another.
- Label the maximum temperatures (degrees Celsius) for each.



### **Analysis Questions**

1. Were the patterns of the two graphed lines related in any way? Why or why not?
  
2. Were the graphed lines linear? If not, what could explain the pattern that was observed?

### **Conclusion Questions**

1. Describe how your egg appears.
  - Is the white cooked?
  - Is the yolk cooked?
  - Would you be willing to eat this egg?
  
2. Do you think solar cooking is an effective method to heat food? Why or why not?
  
3. What could you have done to improve your design? Be specific.
  
4. Why might this way of cooking be considered “environmentally friendly”? (What traditional cooking fuel sources don't you use to cook the egg?)
  
5. Research the social injustices within developing countries with regards to access to alternative energy, specifically solar.
  
6. EGGtraordinary recipes: research and write using the eggs you have cooked

### Integrated Grading Rubric

Content Area	Exemplary	Excellent	Good	Requires Development Re-Submit	Self Grade and Comments Educator Grade/Comments
MATH	Graphs depict data collection accurately and neatly. Data is complete and easy to follow. Data makes sense and is correlated with design	Graphs depict data collection accurately and neatly but are missing 1-3 units. Data is not complete and but is easy to follow. Data is correlated with design	Graphs depict data collection but are slightly hard to read and are missing 1-3 units. Data is not complete and but is easy to follow. Data is correlated with design	Graphs depict data collection but are slightly hard to read and are missing 1-3 units. Data is not complete and but is easy to follow. Data is not correlated with design	
AP Environmental Science	All materials used are re-cycled and the egg cooker design is creative and makes sense based on your research of solar power	All materials but 1 component used are re-cycled and the egg cooker design is creative and makes sense based on your research of solar power	All materials but 2 component used are re-cycled and the egg cooker design is somewhat creative and makes sense based on your research of solar power	Materials used are not re-cycled and the egg cooker design is not creative and does not makes sense based on your research of solar power	
AP World History	Research question is answered and communicated with clear correlation to historical and current social injustices toward developing countries	Research question is answered but and communicated but only has limited correlation to historical data it does answer current injustice question posed	Research question is answered but and communicated but only has limited correlation to historical limited correlation to current injustices	Research question is answered but and communicated but only has limited correlation to historical limited correlation to current injustices	
Language Arts	Recipe shows clear directions from start to finish and are grammatically accurate	Recipe shows clear directions from start to finish with the exception of 1 step and are all grammatically accurate	Recipe shows clear directions from start to finish with the exception of 2 steps and are mostly grammatically accurate	Recipe does not show clear directions from start to finish is not grammatically accurate	
Engineering	Design and fabrication follow the design process and are structurally sound and safe	Design and fabrication follows the design process but is not completely structurally sound and safe	Design and fabrication follow the design process with the exception of 1 component but is not completely structurally sound and safe	Design and fabrication do not follow the design process and vessel is not structurally sound and safe	

