Name: _____

Solar Cooking

(Warming Up to the Properties of Solar Radiation & Its Uses in Our Homes)

Part 1: Virtual Solar Cooker Wrap-Up

In this section, you need to start by making some notes about what you observed while investigating the properties of radiant (light) energy using the "Virtual Solar Cooker." You will then answer a series of questions as you work through the process of selecting materials and constructing a solar cooker with your team.

Virtual Solar Cooker Notes

What happens when solar energy strikes an object?

Here are three possibilities: it may be *transmitted* through the object, the object may *reflect* the solar energy, or the object may *absorb* it. Most objects do all three, but some are better at each than others.

It is useful knowledge to understand how different materials transmit, reflect and absorb solar radiation. For instance, in the case of a solar cell, it is important to coat the surface with a material that is a poor reflector—we want as much light as possible to enter the cell. Accordingly, creating comfortable, well-lit homes, schools, and offices requires an understanding of which building materials transmit, reflect, and absorb solar radiation. (After experiencing this lesson you may even begin to select the color and texture of new clothing purchases depending on the strength of sunlight during the seasons!) For your solar cooker, choosing materials based on their ability to transmit, reflect and absorb is important and may make a big difference in your cooking success.

From your experience using the virtual solar cooker and in your daily life, make some statements about how well various materials reflect or transmit solar radiation and how well each material absorbs solar radiation.

1. **Transmission**: On the basis of your observations, rate each material's ability to transmit light as *Excellent, Good, Fair, Poor, No Ability* and record it as the description in the Data Table.

2. **Reflection**: On the basis of your observations, rate each material's ability to reflect light as *Excellent, Good, Fair, Poor, No Ability* and record it as the description in the Data Table.

1. **Absorption**: On the basis of your observations, rate each material's ability to absorb light as *Excellent, Good, Fair, Poor, No Ability* and record it as the description in the Data Table.

2. For each column, rank each of the materials so that the number 1 represents the material that is the best transmitter, reflector and absorber.

Data Table 1.

Material	As a Transmitter	As a Reflector	As an Absorber
	Description-Rank	Description-Rank	Description-Rank
Mirror			
Window Glass			
Frosted Glass			
Aluminum Foil			
Mylar			
Copper Sheeting: Unpainted			
Copper Sheeting: Black-painted			
Wood			
Waxed Paper			
Cellophane: Clear			
Cellophane: Blue			
Cellophane: Red			
Construction Paper: Black			
Construction Paper: Yellow			
Construction Paper: Red			
Construction Paper: Blue			
Construction Paper: Green			

Part 2: Select a Solar Cooker and Test Your Predictions

Now it's time to start field-testing your ideas! First take a look at the questions below to help you select a type of cooker and materials:

1. What food(s) do you want to cook? Explain the type of solar cooker that would be best for the job.

Food(s):	Explanation:
Cooker Type:	

2. What properties of transmission, reflection, and absorption of light would you look for in the materials used to build a solar cooker? (For example, should your cover be a better transmitter, reflector or absorber?) Make a materials list for the three (3) parts of your solar cooker and explain your reasons for choosing them in the boxes below.

Cover (Glazing)	Insulation	Reflector

3. Think back to the equation: I = T + R + A, now use this relationship to describe the materials you have chosen.

Cover (Glazing)	Insulation	Reflector

4. Make a sketch of your solar cooker below.

5. What else might you want to find out about your solar cooker (Hint: it may also let you know that your food is done.) Work with your team and teacher to devise a way to collect this data and create a data table below or using an electronic spreadsheet.

Please review all of the safety instructions with your teacher and team.
Now you are ready to construct and cook (test)!

Solar Cooking Thought Questions:

6. Look back at Data Table 1. Did your observations from the virtual investigation help you to make decisions about how your cooker would measure up in real life?

7. What are the limitations of using a solar cooker? Describe how they may be overcome.

8. What could you do to improve your design?

9. Using what you learned, what exterior and interior colors and materials would you want in a car if you lived in a hot sunny climate? What colors and materials would you pick if you lived in a cold sunny climate?

10. How might you use the principles of solar radiation in other parts of your life or home?