

Learning Outcomes:

Nature of Science	Students should be able to research and present information on the contribution that scientists make to scientific discovery and invention, and its impact on society
Physical World	Students should be able to design, build, and test a device that transforms energy from one form to another to perform a function; describe the energy changes and ways of improving efficiency
Biological World	Students should be able to evaluate how humans can successfully conserve ecological biodiversity.....appreciate the benefits that people obtain from ecosystems

Task

You and a group of friends are on a camping trip in Portumna Forest Park. You brought a lot of food that you plan to cook. Just as you are talking about lunch, someone notices a sign in the forest. It reads: "DUE TO RECENT HOT WEATHER, NO OPEN FIRES ALLOWED!" You and your friends discuss the problem and decide that you can use items around you to **design, construct, and test a cooker** that can be used to prepare your meals. Your cooker will use **thermal energy from the Sun**.

After looking through your backpacks, you and your friends find the following materials:

- an empty cardboard box with its lid,
- scissors,
- aluminium foil,
- tape,
- plastic wrap,
- some black garbage bags,
- several sheets of newspaper,
- and a pencil.
- Someone even brought a thermometer!

Determine how each material can be used to collect, concentrate, and store thermal energy from the Sun.

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Consider the following:

What materials might best absorb heat inside the cooker?	
How can you insulate the cooker, so it maximizes the heat contained in it?	
How will you transfer the Sun's thermal energy into your device?	
How will thermal energy enter the solar cooker and become trapped inside it?	
What time of the day should you operate your solar cooker?	

Using the materials available, have each of your friends provide a design for a solar cooker.

- Discuss each design and determine which might best maximize thermal energy transfer.

Friend 1:	Friend 2:	Friend 3:	Friend 4:	Friend 5:

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- Based on your choice of best design, make a detailed, labelled drawing of your design.

- Discuss with your friends how you will build and test the cooker.

Discussions				
Friend 1:	Friend 2:	Friend 3:	Friend 4:	Friend 5:

Using your chosen design and the available materials, construct your solar cooker.

- Analyse the device for potential weaknesses, and, if necessary, modify the device to eliminate the possible problems.

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- Test the solar cooker to determine whether it is likely to cook food. What criteria will you use to determine if the cooker will cook your food to a safe temperature?

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- Develop a plan for data collection. • Use the results of your test to further modify the solar cooker, if necessary.

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<p>What time of day did you choose to test your solar cooker? Why?</p>	
<p>What types of data did you collect during your tests?</p>	
<p>What conclusions can you reach concerning the ability of your solar cooker to maximize thermal energy transfer?</p>	
<p>How could you improve the design of the solar cooker to increase the thermal energy it captures from the Sun? What changes would you make if any material was available?</p>	
<p>What are some factors beyond your control that might reduce the ability of your cooker to maximize the transfer of the Sun's thermal energy to the cooker? Explain your answer.</p>	