

# “In the Wild”

## Module 1, Adventure 2

The logo for "EXPLORE IT" is enclosed in a black rectangular border. The word "EXPLORE" is in a bold, sans-serif font, with the letter "O" highlighted in green and the letter "R" in purple. The word "IT" is in a smaller, regular sans-serif font.

*This is one of two options for Adventure 2 (the other option is a wind mobile activity). Choose which one you would prefer to do, or do them both!*

### **Prompt:**

Use the power of the sun to heat a solar oven and make a treat (edible or crafty)!

Solar ovens use solar energy -- the light and heat from the sun -- to (slowly) heat things up. It is best to use a solar oven on a hot (at least 80°F / 26°C) and sunny day. If it is not hot or sunny, you can make your solar oven and save it for a day that is!

### **Notes about solar ovens:**

In some tests of this design, at 80-90°F on a sunny afternoon, it took about 20 minutes for chocolate to melt and about 30-35 minutes for a marshmallow to get warm enough to become soft and melt some of the chocolate in a s'more.

The solar oven can easily heat up to about 160-200°F (71-93°C). It is very important to **use oven mitts to pick up anything inside (like a thermometer or glass dish). They will get hot!** The late afternoon might heat better, because of the angle of the sun and the angle of the reflector.

### **\*\*Important\*\***

Do not cook anything in the solar oven that would not be safe to eat if it is not cooked all the way through (eggs, etc.) Save that for a stove or oven with your grown-up!

### **Materials:**

- Cardboard box that is large and flat (pizza box, delivery box, etc.)
- Scissors or cardboard knife (please ask for a grown-up to help you with step 1!)

- Aluminum foil
- Tape and/or glue
- Black paper (or a black oven tray)
- Oven mitts or a towel
- Option 1: Plastic wrap; Option 2: Heat proof bowl or casserole dish
- *Optional: Heat proof dish*
- *Optional: Oven thermometer*
- *Optional: Explorer Notebook*

Pick an item to make in your solar oven:

<p>Nachos</p> <ul style="list-style-type: none"> <li>● Chips</li> <li>● Shredded cheese</li> </ul>	<p>S/mores</p> <ul style="list-style-type: none"> <li>● Marshmallow</li> <li>● Chocolate</li> <li>● Graham crackers</li> </ul>	<p>Mixed Crayons</p> <ul style="list-style-type: none"> <li>● Small bits of crayons</li> <li>● Silicone baking cups or small paper cup</li> </ul>
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## Instructions:

### Make and Test Your Solar Oven

1. (*Grown up support recommended for this step!*) You'll need to make some changes to your box so that you can turn it into a solar oven. If the cardboard is difficult to cut, we recommend working with a grown up to help do this step. Here's a picture of what your solar oven will look like when you're done.



2. The lid of your box will be the reflector. You'll want to cut off any extra side flaps from the top of the box. Save the extra flaps to use later.

- a.



3. Cover the whole lid of the box with foil. Use glue or tape to hold it in place.
  - a. The shiny foil is what the sun will reflect off of to help heat the items you put in your solar oven. Try to keep the foil smooth, without a lot of wrinkles.
4. Line the inside of the box with aluminum foil, too. Use glue or tape to hold the foil in place.



5. Use the flaps you cut off the lid or other pieces of cardboard to make sticks that will hold the lid up. Tape the sticks to the lid, but not to the bottom of the box. That way you can change the angle for the lid of the box when you are ready to test your oven.
6. Put a piece of black paper in the bottom of the box.



7. Option 1 (plastic wrap):



- a. *Optional: If you have a thermometer, you can put it on the black paper.*
- b. Rip two pieces of plastic wrap that will fit over the top of the opening of the box and wrap it all the way around the sides.
- c. Tape down the double layer of plastic wrap so it is as air tight as possible. Sunlight will enter through the plastic wrap and the plastic will trap the heat, keeping it inside the oven.
- d. Tape the flaps on the lid to the bottom of the box so the most amount of sun possible is reflecting off the lid into the box.
- e. If testing with a thermometer, check the temperature every ten minutes to see how it changes. Turn the oven towards the sun if the angle changes.

8. Option 2 (heat proof glass bowl or a glass casserole dish):



- a. *Optional: If you have a thermometer, put it under a glass bowl on the black paper.*
- b. Tape the sticks that are taped on the lid to the bottom of the box so the most amount of sun possible is reflecting off the lid into the box.
- c. If testing with a thermometer, check the temperature on the thermometer every ten minutes to see how it changes.
  - i. Use oven mitts or a towel to lift the glass bowl, it will be hot! *Ask for a grown-up to help with this!*

**To make s'mores or nachos:**

1. Gather the items you'll need for s'mores (graham crackers, marshmallows, and chocolate) or nachos (chips and shredded cheese).
2. Put your s'mores or nachos together on the black paper or on a heat safe plate.
3. Place the s'mores or nachos under the plastic wrap or the glass bowl.
4. Check your goodies every ten minutes or so. Remember to use an oven mitt or towel with the thermometer and glass bowl, they will be hot! *Ask your grown-up for help.*

**To make mixed crayons:**

1. Gather very small pieces of crayons.
2. Put a thin layer of them in a silicone baking cup or a small paper cup.
3. Place the cup on top of the black paper, under the plastic wrap or glass bowl.

4. Check your goodies every ten minutes or so. Remember to use an oven mitt or towel with the thermometer and glass bowl, they will be hot! Ask your grown-up for help.

**While you wait:**

1. Play nature tic tac toe.
2. Make a wind mobile (check out the other adventure guide).
3. Sit quietly outside or near a window and observe what you see and hear. Close your eyes. What do you notice?

*For explorers using an Explorer Notebook:*

1. Every ten minutes, check your solar oven and the item you are heating up. Write or draw what you notice and what the temperature is if you are using a thermometer.
2. When your item is done, write or draw your end result and how you felt during the process.

Look below to see an idea for how to design your page. You can use this or set up your notebook however you want!

**Resources:**

1. For additional ideas and resources, check out this Beyond the Chalkboard [Solar S'mores](#) activity from Boston Children's Museum.

**Extensions:**

The following are optional steps you can take if you want to extend this adventure:

1. Check out some interesting pictures and information about the sun from NASA: <https://solarsystem.nasa.gov/solar-system/sun/overview/>
2. Test your solar oven in various ways (pick one each time). Keep track of the differences during:
  - a. Different times of the day
  - b. Different location
  - c. Different weather
3. Think about other things you can melt in your solar oven. Remember, do not try anything that is dangerous to eat if it is not cooked all the way through!
4. Go to the "In the Wild" board on Flipgrid and share your creation!

## Explorer Notebook

You can use this to help you set up your Explorer Notebook!

### Solar Oven Module 2, Adventure 2

Date:

Outdoor temperature:

Item in the solar oven:

Time	Temperature Inside the Oven	Description of the Item
0 minutes		
10 minutes		
20 minutes		
30 minutes		
40 minutes		

My final product:

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