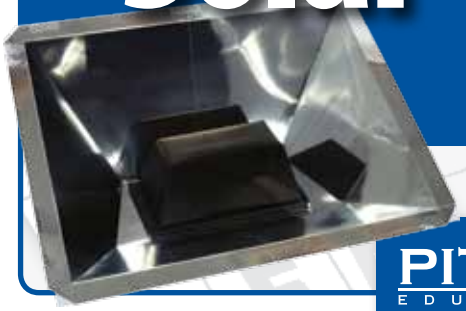
Solar Oven Kit User Guide



PITSCO EDUCATION

Materials Included

- 2 sheets of 11" x 17" reflective material with pattern
- 11" x 17" sheet of transparency material
- 12" x 18" sheet of thin foam
- 10" x 12" black aluminum foil with imprinted pattern
- 3" x 6" piece of basswood
- 2 paper clips

Items Required (not included)

- Stick glue
- Scissors
- Hobby knife (optional)
- Transparent tape
- Ballpoint pen
- Straightedge such as a ruler
- Waxed paper (optional)

Making the Reflector Box

1. Cut out the parts from Sheets 1 and 2 of the reflective material along the solid lines. Cut on the lines as close as you can and be sure to cut the solid lines that are between two parts (Figure 1a). **Tip:** If using the hobby knife, use the straightedge to help cut straight lines along the pattern (Figure 1b).

   Be sure to cut apart the small rectangular Parts B and C (Figure 1c on next page). Do not cut along any of the dashed lines.

Figure 1a

Figure 1b

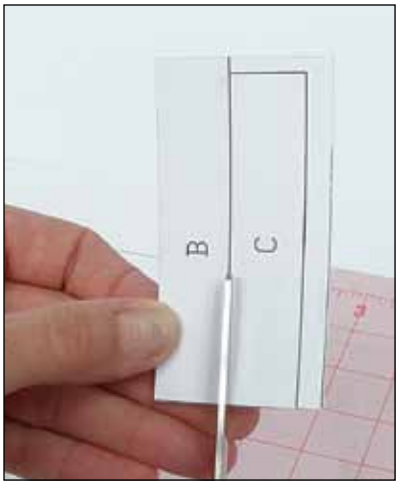


Figure 1c

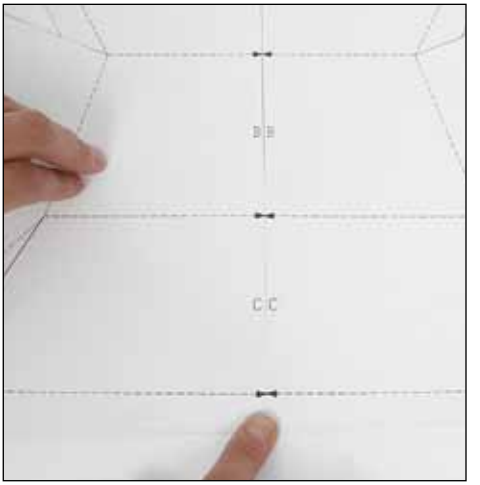


Figure 2

2. Lay the two big pieces with Sections A, B, and C so the pattern faces up. Align the two pieces so the arrows line up pointing to each other (Figure 2). Using three or four small pieces of tape, connect these two pieces.

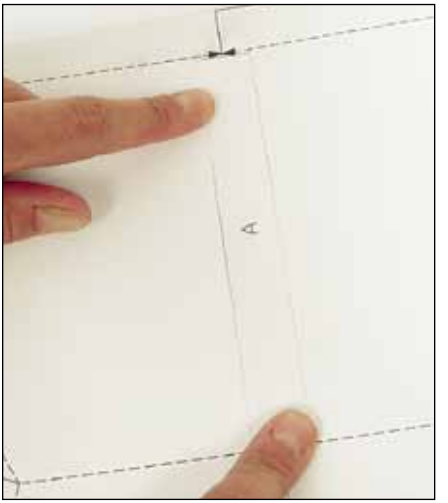


Figure 3

3. Take Part A and glue it over the centerline of Section A (Figure 3). Continue by gluing Part B over the centerline of Section B and Part C over the centerline of Section C. It doesn't matter whether the parts are glued with the shiny or white side facing down.

4. Glue one Part D horizontally over the centerline of the flap edge above Section A. Repeat this with the other Part D under Section C. The glued Parts A through D will now look like a skinny capital I.

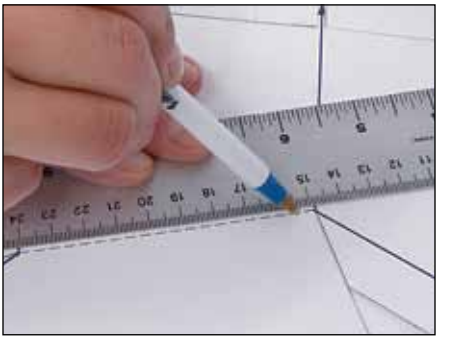


Figure 4

5. Using the ballpoint pen and a straightedge such as a ruler, roll the pen tip along all the dashed lines to lightly score the glued-together pieces (Figure 4).

6. Fold back the flap edges of the winglike sides and along Sections A and C (Figure 5).

7. Flip over the material. Fold Sections A and C and the wings extending from Section B to the scored lines to bend them toward the center of the material.

8. Fold in the smaller inside flaps of the wings and Section A. Glue the flap on one side of Section A to the top of a wing. The flap should be on the outside (white) of the reflector box (Figure 6a). Repeat on the other side of Section A. **Tip:** Rub the flap to the box securely by using the surface of a desk or table (Figure 6b).

Figure 5

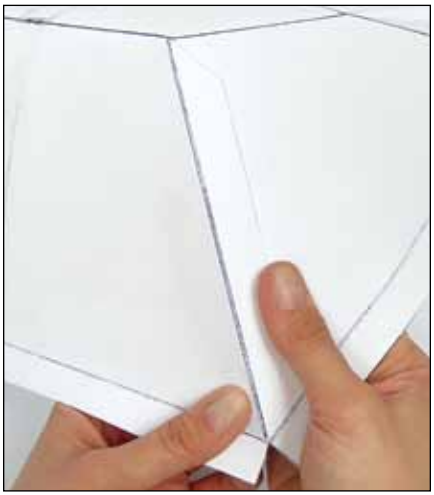


Figure 6a

Figure 6b

9. Glue the flap on one side of Section C to the bottom of a wing. Repeat on the other side of Section C.

10. Turn the reflector box facedown. Place a Part E over each corner of the reflector box and mark where they stop covering the box edges. Apply glue in the marked sections and press a Part E – shiny side down – over each corner (Figure 7).

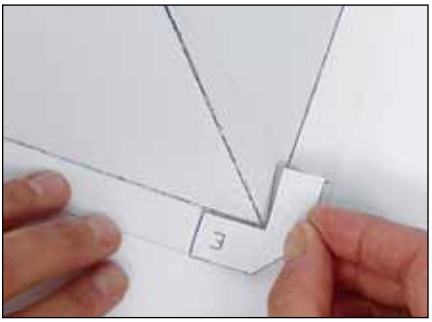


Figure 7

Insulating the Reflector Box

1. Take the thin foam and center it lengthwise over the back of the reflector box. It will be about1/4" to 1/2" above the flaps of the reflector box on both sides (Figure 8). Mark where the foam ends on each side of the box.

2. Apply glue above the marked line of Section A and place the foam over it, keeping the foam where you marked, and press it into the glue. Repeat with Sections B and then C.

3. With the foam out straight from the box sides, use the scissors to cut a slit to the edge of the box top where there are creases between Sections A and B and B and C (Figure 9). Do this for both sides of the box.

4. Fold down one side of the foam from Section A and cut off where it extends over the box flap (Figure 10). Repeat on the opposite side. Glue these two sides down to the box.

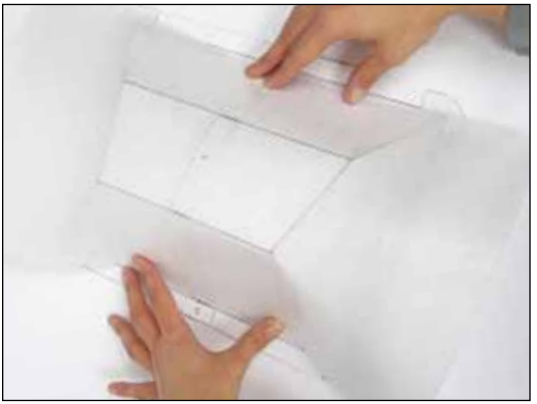


Figure 8

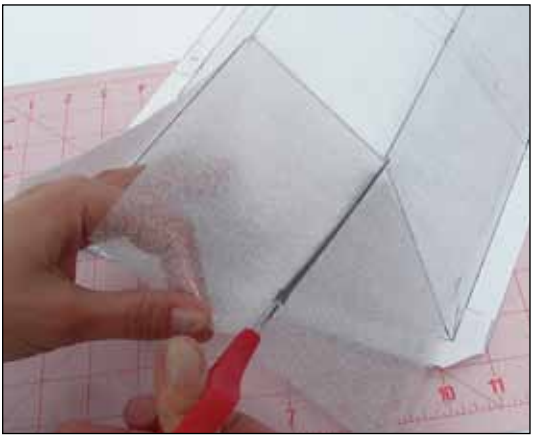


Figure 9

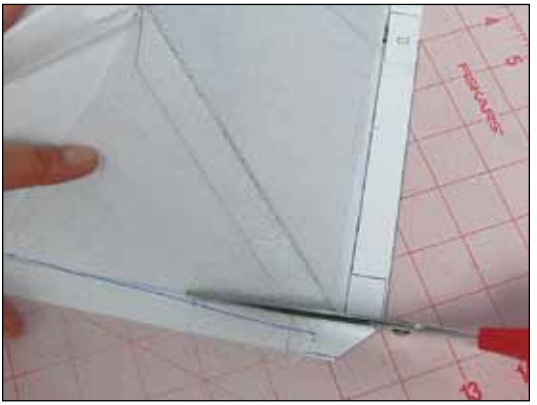


Figure 10

5. Fold down one side of the foam from Section C and cut off where it extends over the box flap. Repeat on the opposite side. Glue these two sides down to the box (Figure 11) – you will have to cover some of the foam from Section A.

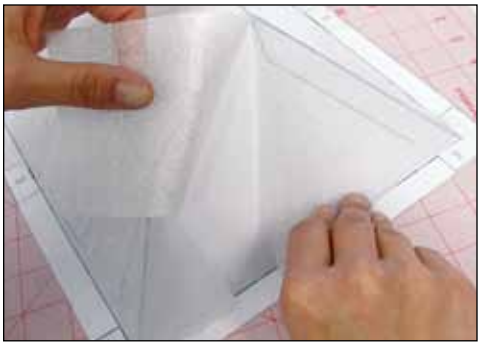


Figure 11

6. Smooth down the foam from Section B and glue it to the sides over the other foam. Repeat on the other side. The outside of the reflector box should now be covered by foam except for the edges (Figure 12).

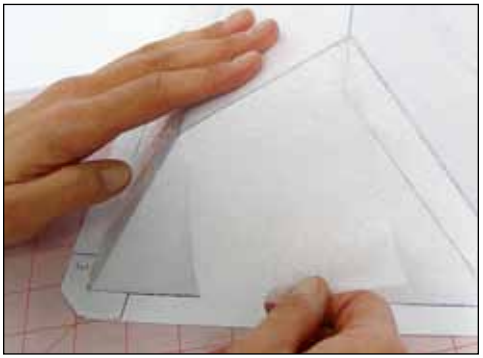


Figure 12

7. Lay the transparency down on a flat surface and place the reflector box facedown over it. Draw a line on the transparency around the box (Figure 13). Cut the transparency on the marks.

8. Align the trimmed transparency over the reflector box opening. Use three pieces of tape to attach the transparency to the top of the box.

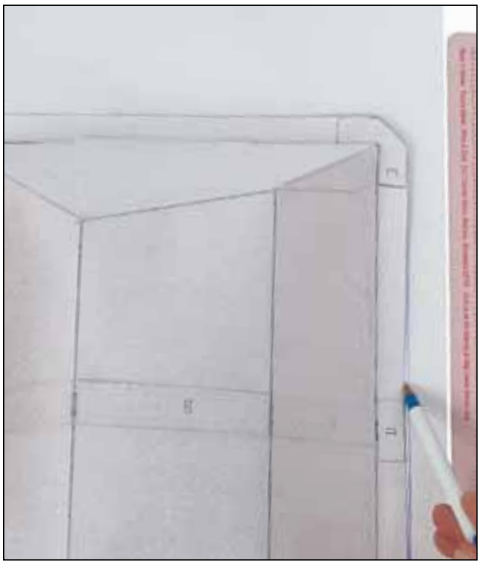


Figure 13

Constructing the Oven Box

1. Carefully cut around the imprinted pattern on the black aluminum foil (Figure 14). Cut only the lines on the outside edge – do not cut any inside lines. When complete, you will have two pieces cut out.

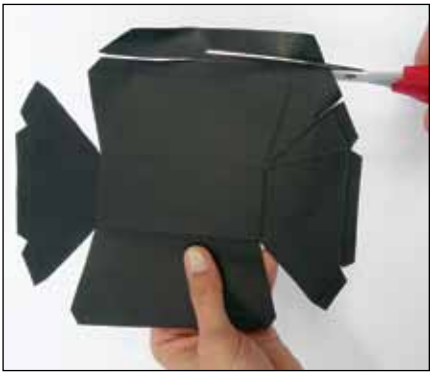


Figure 14

2. The smaller piece is for the oven box base. With the upraised side of the imprint facing down, place the piece of basswood over the center of the foil. Fold the sides of the foil up and over the basswood (Figure 15a). Run the straightedge against the fold to get a clean, sharp fold (Figure 15b).

Figure 15a

Figure 15b

3. Carefully pull back the foil overlaps and place glue where they were on the basswood. Press the foil down to the wood.

4. Take the second piece of foil and fold over the four sides, one at a time, toward the middle and flatten each one down firmly. Then fold the sides back up – this process helps to create a neat crease.

5. Fold over the end flaps of the two larger sides of foil.

6. Fold the side flaps of the smaller sides of foil over the larger sides (Figure 16).

Figure 16

7. Fold over the end flaps of the smaller sides over the ends of the large sides (Figure 17). You now have an oven box that will rest on top of the oven box base.

Figure 17

Using the Solar Oven

1. Find a sunny location outdoors. Place the solar oven's reflector box on the ground or on a table or similar surface. Standing behind the oven, locate the Sun overhead and direct the oven to face in its direction. You might direct it to face a little west of the Sun so it will collect sunlight over a longer period of time.

Figure 18a

2. Pull up the transparency and place the oven box base in the middle of the reflector box (Figure 18a). Put the food item on the base and place the oven box over it (Figure 18b). Replace the transparency over the opening and use the two paper clips to secure it to the reflector box (Figure 18c). Check that the Sun is reflected onto all sides of the oven box. If it isn't, adjust the oven as needed.

Figure 18b

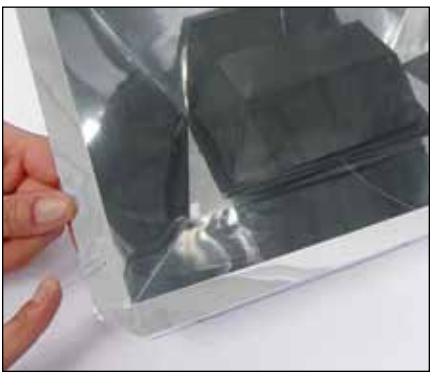


Figure 18c

Tips

- The solar oven works best during the warm half of the year when the Sun is closer. It also works better the closer to the equator you are located. The successful use of the oven is dependent on the time of year it is and your location. For example, using it in northern states in January or February won't work very well.
- Consider the weather. The solar oven is very light, so a windy day is a poor time to use it as the wind might blow over the oven.
- To lift the oven box, try using either thin gloves or a napkin to hold it. Standard pot holders are too thick and you may crush the box. The aluminum will cool very quickly, so a thicker pot holder really isn't necessary.
- For cooking, you can place the food items either on a small piece of parchment or waxed paper or you could use a muffin cup.
- You can apply a temperature strip to the top of the oven box if you wish to know how hot the oven gets. Do this before using the oven, not while it is in use.

Food Suggestions

- S'mores – Place a piece of milk chocolate on a graham cracker and spread marshmallow creme over it. Top with another graham cracker and cook until warm and melted.
- Nachos – Break tortilla chips to fit into a muffin cup and top with nacho cheese and other toppings such as black olives, jalapeños, and salsa. Cook in the solar oven until hot.
- Other – If you live in a southern climate and it is warmer weather, your solar oven may get hot enough to cook other items. However, be careful of cooking items with egg product that may not cook enough to be safe to eat.

Concepts to Research

- Heat gain, heat loss, and heat storage
- Parabolic cooker versus solar box cooker
- Earth-Sun geometry and how it affects solar oven's ability to function properly (for example, the winter solstice versus the summer solstice)
- Materials and designs used among different cultures

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