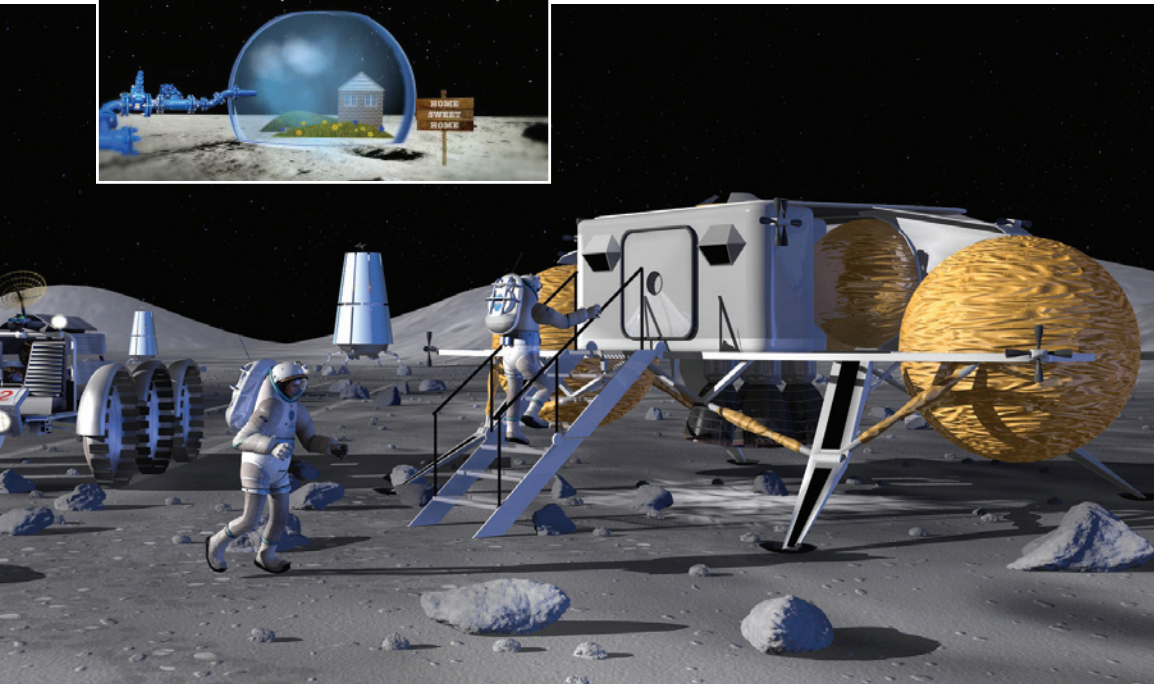


Build a Solar Oven

DESIGN challenge

To design and build a solar box cooker, and test it to see if it works well enough to make S'mores!



OBJECTIVE

To demonstrate an understanding of the Engineering Design Process while utilizing each stage to successfully complete a team challenge.

PROCESS SKILLS

Experimental design, measuring, graphing and data analysis

MATERIALS

General building supplies

Thermometer

Timers

Cardboard box

Aluminum pans

Aluminum foil

Black construction paper

Plexiglass or plastic wrap big enough to cover the box

Sunshine, OR gooseneck lamp with 100 W bulb

S'mores fixin's (graham crackers, marshmallows and chocolate)

Oven mitts or tongs

STUDENT PAGES

Ask, Imagine and Plan

Experiment and Record

Quality Assurance Form

Fun with Engineering at Home

PRE-ACTIVITY SET-UP

It is recommended to take a few minutes at the start of the session to discuss safe handling procedures of the food and of their solar ovens when exposed to the sun: (1) Remind students the importance of hand washing before handling food; and (2) Ovens will get hot and will require the use of protective gear or a tool to manipulate items in and out of the ovens.

Please note: This activity may require two 60-90 minute sessions to complete.

solar oven

MOTIVATE

- Have students watch the video “Living on the Moon“:

<http://svs.gsfc.nasa.gov/goto?10515>

SET THE STAGE:

ASKIMAGINE & PLAN

- Share the *Design Challenge* with the students
- Remind students to imagine a solution and draw their ideas. All drawings should be approved before building.
- Tell students that if they succeed in their design, a tasty treat will be had!

CREATE

- Hand out the materials to the students and challenge them to build their own solar ovens.

EXPERIMENT

- Have students follow the directions on the *Experiment and Record* worksheet to complete their experiment.
- Once the oven is built, students should place a S’more and the thermometer in the box and cover with plastic wrap or plexiglass lid.
- Place the box in direct sunlight (students may have to tilt the box so that there are no shadows inside). If it is a cloudy day, use a goose neck lamp with the 100 W bulb.
- Ensure students use oven mitts when moving the plexiglass lid or removing items from the solar oven once exposed to the sun.



IMPROVE

- If there is time, have students inspect their designs and the experiment results. Allow teams to rework their designs if needed.

CHALLENGE CLOSURE

Engage the students with the following questions:

- *Whose oven reached the highest temperature? What was that temperature? Did it melt the marshmallows and the chocolate?*
- *What could you have done to make your solar oven work better?*
- *Does it make a difference using actual sunlight compared to light from a lamp? Why or why not?*
- *How did the distances from the bottom reflective surface affect the cooking of the food in your oven?*

END OF PROGRAM

This session concludes the NASA's Beginning, Engineering, Science and Technology series. Students now should have a firm grasp of the Engineering Design Process and how it is applied in real applications of our quest to travel to the Moon, Mars and beyond. Print out a certificate for each student for completing all the steps to becoming a NASA's BEST student (see end of guide).

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Teacher page

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