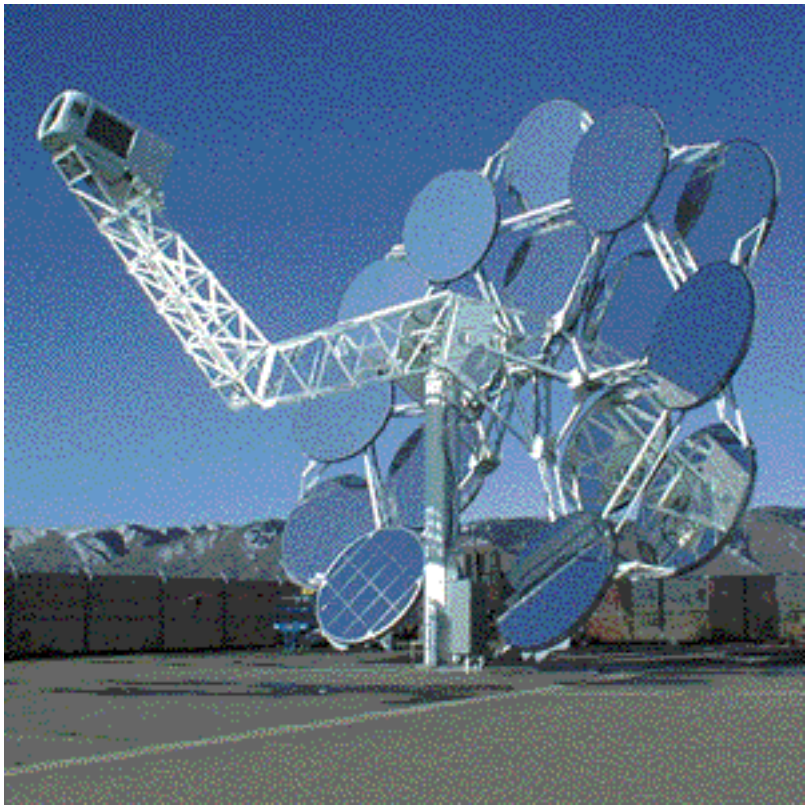
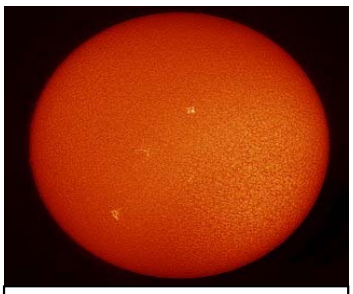
APPLIED TECHNOLOGY & ENGINEERING
Future City Project
Soar Power Team Packet



http://www.daviddarling.info/images/parabolic_dish_reflector.gif&imgrefurl=

Solar Energy – Harnessing the Power of the Sun



Telescope: Borg 45ED II
Filter: Solarmax 40/BF10
Camera: Nikon D50
W. Glogowski

Overview:

Did you know the Sun is star? The Sun is actually an average star. There are other stars which are much hotter or much cooler, and stars that are much brighter or fainter. However, since it is the closest star to the Earth, it looks bigger and brighter than any other star in the sky. It is so bright that it is the only star we can see (without the aid of a telescope) during the day. The Sun is mostly made up of the elements hydrogen and helium.

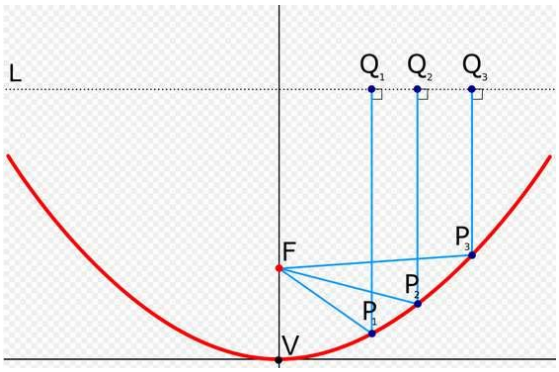
The Sun is neither a solid nor a gas but is actually a plasma. Plasmas are complicated to understand but at the surface of the sun the plasma is gaseous, but as you travel deeper into the Sun's center it gets denser. The center of the Sun is usually referred to as its "core." The energy produced in the Sun's core powers the Sun and produces all of the heat and light that we receive here on Earth. All of the energy that we detect as light and heat on Earth originates from nuclear reactions deep inside the Sun's high-temperature core. This core extends about one quarter of the way from the center of Sun where the temperature is around 15.7 million kelvin (K) or about 28 million degrees Fahrenheit.

We can use the energy from the Sun as a practical source of energy for heating our homes, heating water or even cooking. The challenge is to find ways capture and concentrate the energy from the Sun so we can use it efficiently. All of us have probably experienced sitting in the bright sunlight wearing a pair of dark jeans or a dark tee-shirt and feeling incredibly hot. The most efficient way to use the heat from sunlight is shine lots of sunlight onto a dark surface. Dark surfaces absorb most of the Sun's visible light that falls upon them, and reflect very little. Visible light that is absorbed this way usually causes the dark-colored surface to warm up. Of all colors, black is able to absorb the most light, and produce the most heat.

Parabolic Trough

Overview:

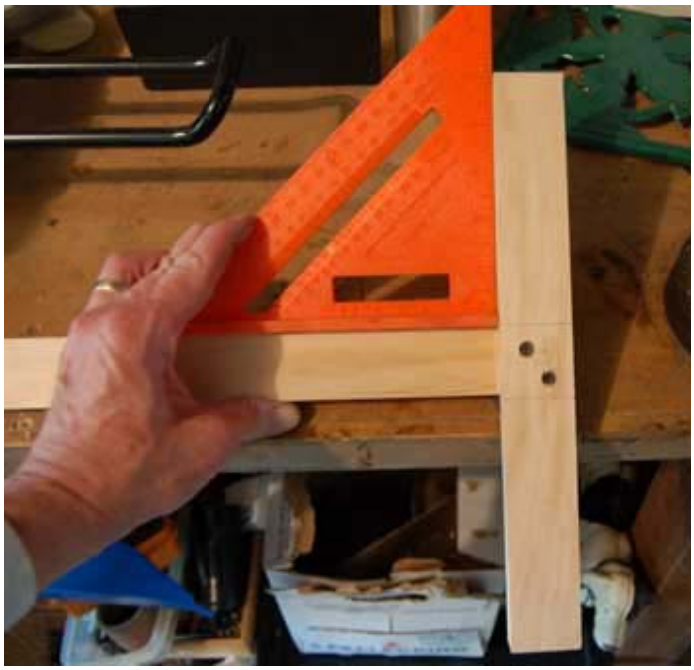
Parabolic surfaces have unique reflective properties. As light strikes a parabolic surface each incident rays is reflected back off the surface to one discrete point called the focus. This property is used in making reflective mirrors for light telescopes and radio telescopes. It is also the property that is used to make a parabolic solar cooker.



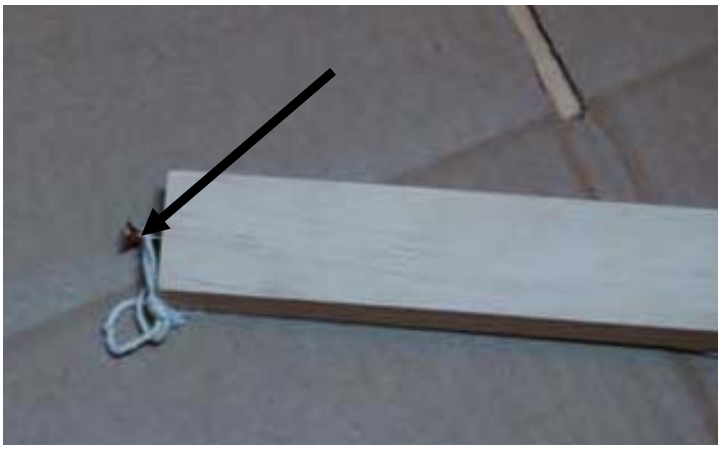
Think of each ray of sunlight (Q1, Q2, Q3) striking the surface of a parabola and being reflected to the focus.

Construction Procedure

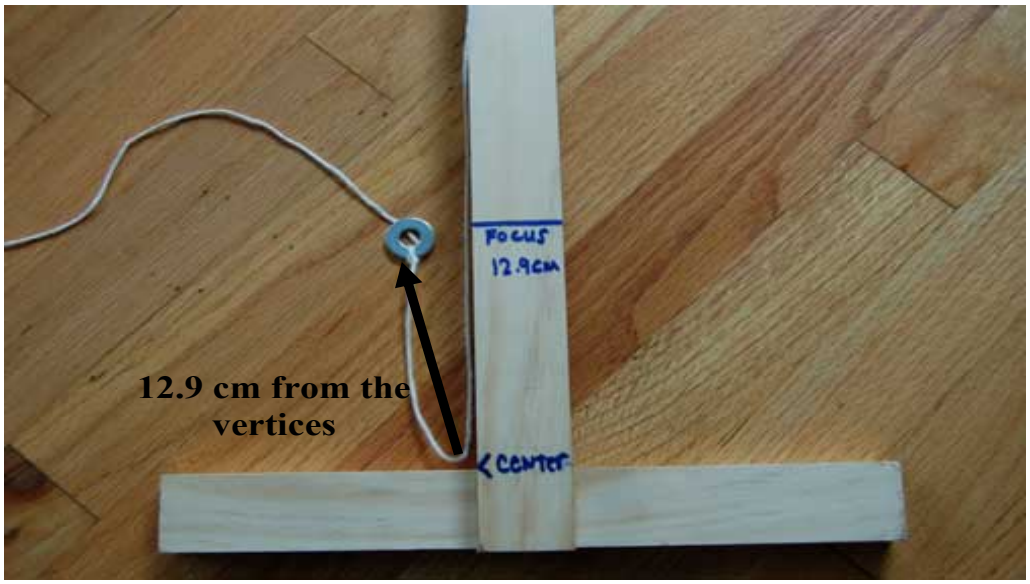
1. Cut the 1 x 3 pine into two pieces one exactly 12 inches long the other 24 inches long.
2. Pre-drill two holes into the 12 inch long pieces as shown. Glue and screw the 12 inch piece as shown, being very careful that the two pieces area at exactly 90^0. Use the right angel square to assure this angle is exact.



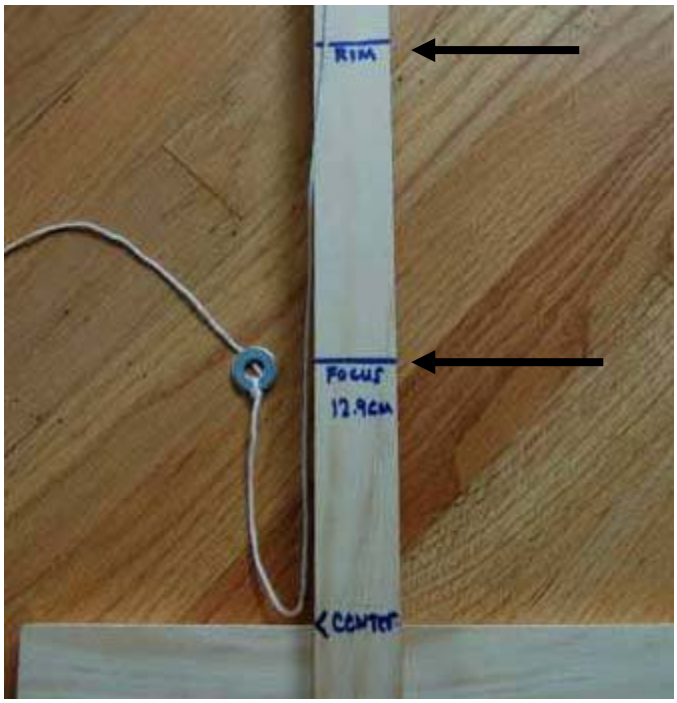
3. Drill a pilot hole on the top of the long 24 inch piece and drive a screw partial into the top as shown



4. Attach your non-nylon string by making a loop and cut the sting to approximately 36 inches. Attach a washer at the free end exactly 12.9 cm from the vertices of the tool as shown

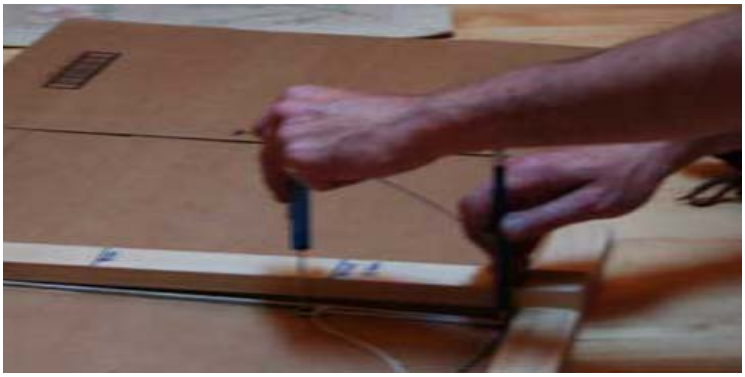


5. Label the tool as shown: "Focus" is where the washer meets the long 24 inch upright, and "rim" is twice the distance of the focus.

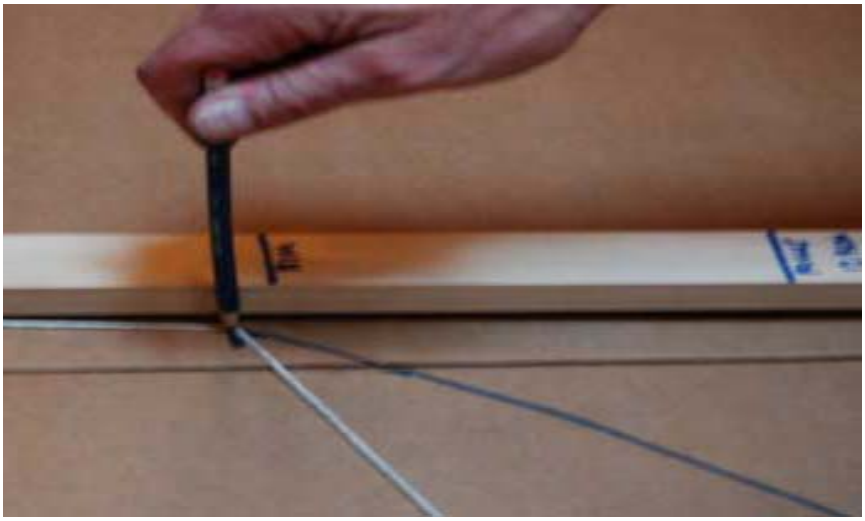


Using the parabolic tool

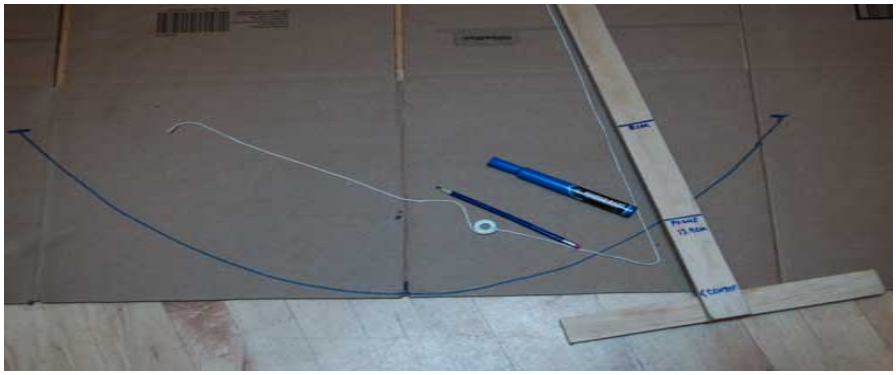
1. Place the cardboard that you plan to use on a flat surface and place the tool on the edge of the cardboard in the center. Hook the washer with a nail or sharp tool to the focal point. Place a pencil at the vertices and pull the tool along the bottom of the cardboard being sure to hold the pencil firmly at the edge of the tool. As you move the tool the pencil will trace out a parabolic curve that is mathematically correct for the focus that you choose.



2. Continue to trace with the pencil until you reach the "rim" Repeat the process for the other side. To ensure you have an accurate parabolic curve you may want to trace the curve several times and make sure you are getting the same profile.



3. When you are done darken the line with a marker



4. Once you have darkened the line you can cut it out with a sharp utility knife and make two cardboard bookends to hold the parabola in shape.

5. Cut a strip of cardboard approximately 12 inches wide and 30 inches long and glue foil to the board to create a reflective surface.

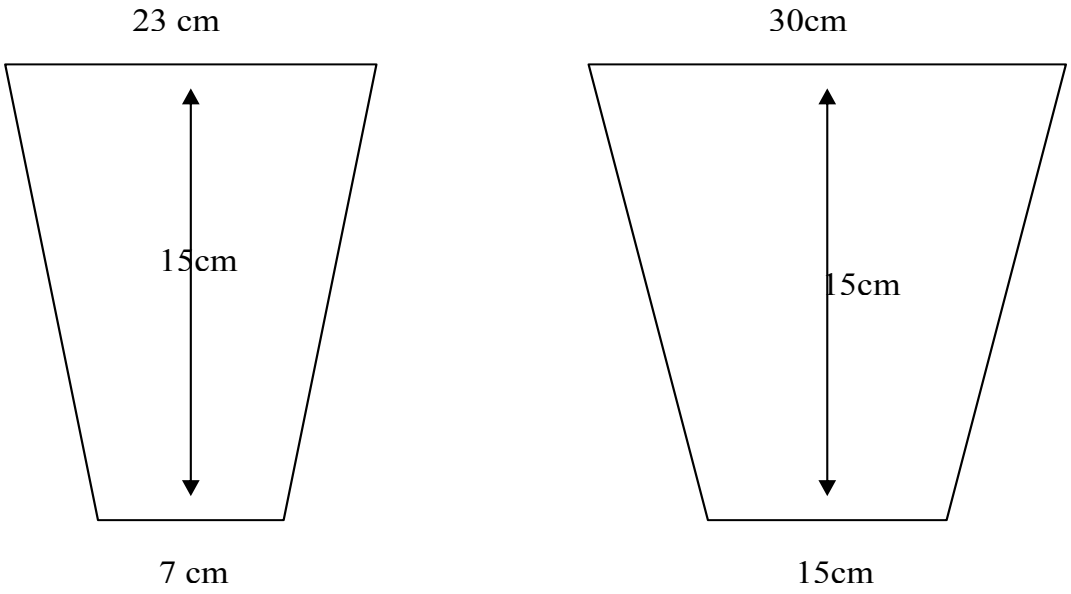
6. The cardboard/foil laminate will be stiff so you will need to pre-roll the board into a circular shape that will conform to the parabolic form. If you are using corrugated cardboard the natural corrugations will allow you to create a relatively sooth surface.

7. Once the cardboard is formed form into the parabolic form and tape it in place. While this is not a full parabolic surface the collecting power of the surface will be greatly amplified at the focus.

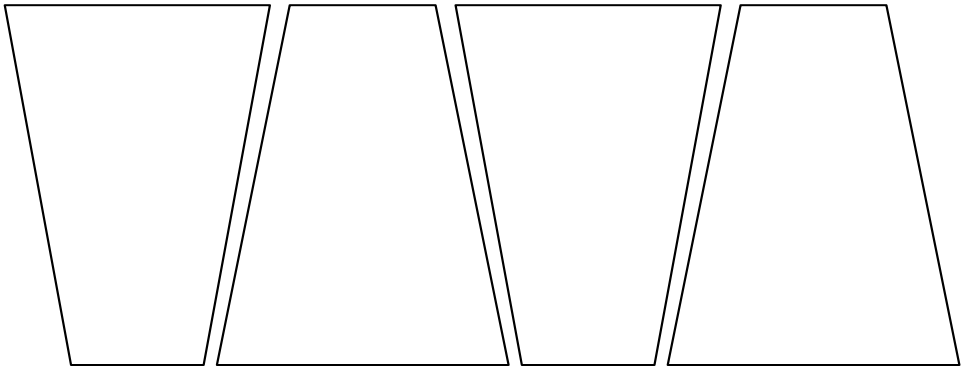
Parabolic Dish

http://home.germany.net/100-441770/work02.jpg

1. Cut two of each.



An easy way to cut the shapes is to “book-end” them into a pattern as follows on one large piece of cardboard.



2. Glue “Heavy Duty Aluminum” foil on the cardboard pieces. If you use the book-end approach first glue down the foil on the back side of the template, allow it to dry and then cut through the cardboard and foil with a sharp utility knife in one step.

3. Once you have cut out the foiled pieces match them as shown in the picture and tape them together.

4. Once taped together they should from a pyramidal horn shaped structure