

# Solar Filter 101

Solar filters are necessary when taking photos of the Sun, just as they are required for viewing the Sun.

Don't ever point an unfiltered telescope or binoculars at the Sun. Even short glimpses of the Sun can cause severe eye damage.

If you don't, you may get this; a melted aperture or retina.



Solar filter material is available in two versions. White light or orange. The Thousand Oak Optical Black Polymer will give an orange Sun. White light filters are about twice the price.

**Thousand Oaks Optical**  
KINGMAN, AZ 86402  
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### **BLACK POLYMER FILTER SHEETS**

**BLACK POLYMER:** One layer with the protective properties throughout the substrate. Silver side faces sun. Transmission: 1/1,000th of 1%. Clean only if necessary since the surface can be easily scratched. Loose dust can be blown off using up to 15 psi air pressure no closer than 6 inches from surface.

**MOUNTING:** The fastest and easiest method is to simply wrap the film around the end of the lens or telescope tube and retain with two or more rubber bands. Some wrinkling will not degrade the image of the sun. With some additional effort, the film can first be attached to a circular tube with an inside diameter close to the outside diameter of the lens barrel or tube. This will allow easy attachment and removal without damaging the film. We recommend leaving the film in the protective packaging when cutting to size.

#### **IMPORTANT:**

- The filtering must be done at the front of the lens or telescope tube. Do not use the solar film at the telescope or viewfinder eyepiece.
- If your telescope has an optical viewfinder, keep it covered keep it covered or make an additional filter for it.
- Check filter for any damage before each use.
- Avoid touching the surface of the film.
- Do not leave the instrument unattended where children or inexperienced adults could point it at the sun without the filter properly attached.
- Make certain that the filter is firmly attached and cannot be bumped or blown off the instrument. Even a quick "flash" of magnified, unfiltered sunlight can cause eye injury.



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This is what you will need:



Cover stock paper

Ambidextrous Scissors, I'm left-handed.

Pen, optional black marker.

Protractor

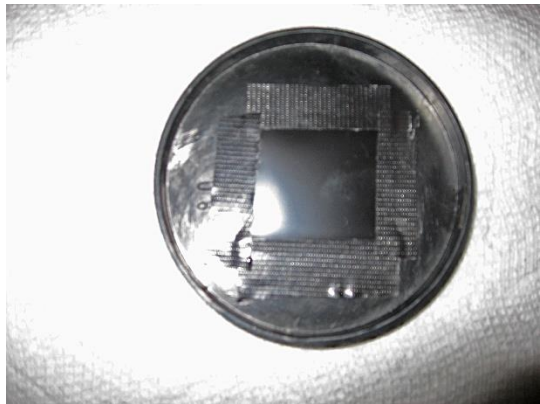
Scotch tape or equivalent.

3/8 inch Double Sided Tape

String, similar to venetian blind cord.

Not shown is black duct tape. Use the cheap stuff, Gorilla tape is really hard to work with.

If you happen to have a telescope that has a dust cap with a small removable cap, all you need is the solar filter sheet, scissors and duct tape. Quick and easy. The smaller size will not affect the size of the Sun, but will reduce the brightness compared to the full aperture style filter.

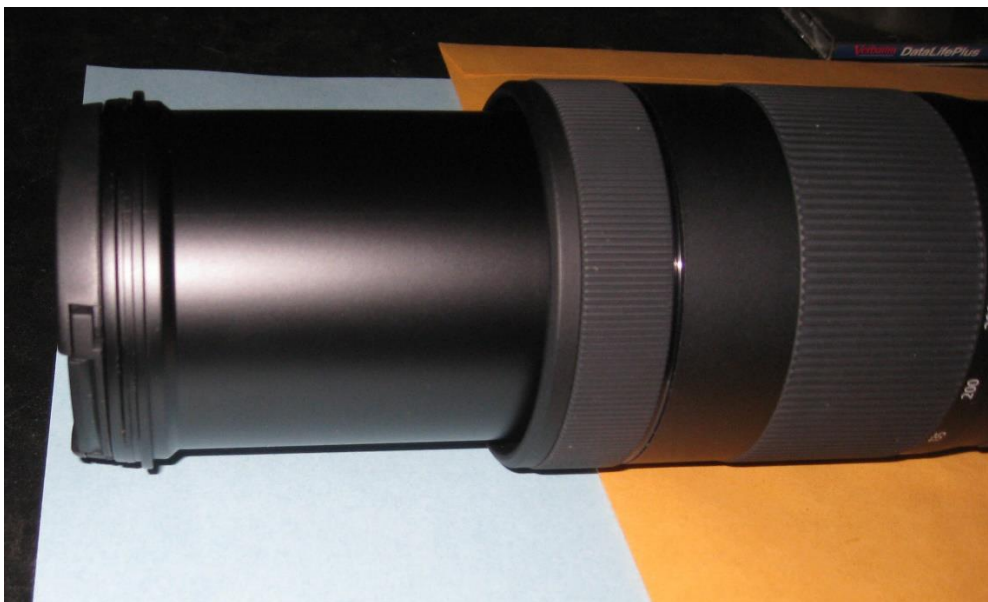


Cut a piece of solar film larger than the hole and tape it to the inside, with the silver side facing the Sun. That's all there is to it, make sure it's on the telescope, before you point the telescope at the Sun.

This picture show two types of zoom lenses. One has the zoom ring at the front, the other has the focus ring at the front.



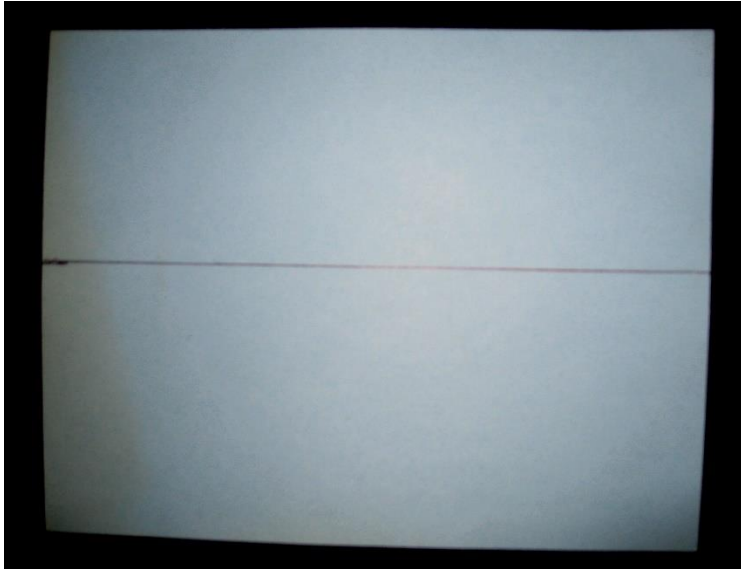
Extend the lens to maximum zoom, lay the lens across the width of cover stock, leaving about a half inch space at the front of the lens. The paper needs to cover the control ring so it rotates with the filter in place. Then draw a line across the height of paper at the back of the front control ring.



Do the same with binoculars or a telescope, at the desired length.



Draw a line and cut.



Using a string is the easiest way of measuring the circumference of the piece. Wrap the string around the widest part of the lens, or telescope tube, adding about 1 inch for overlap. Mark and cut the string to the proper length.



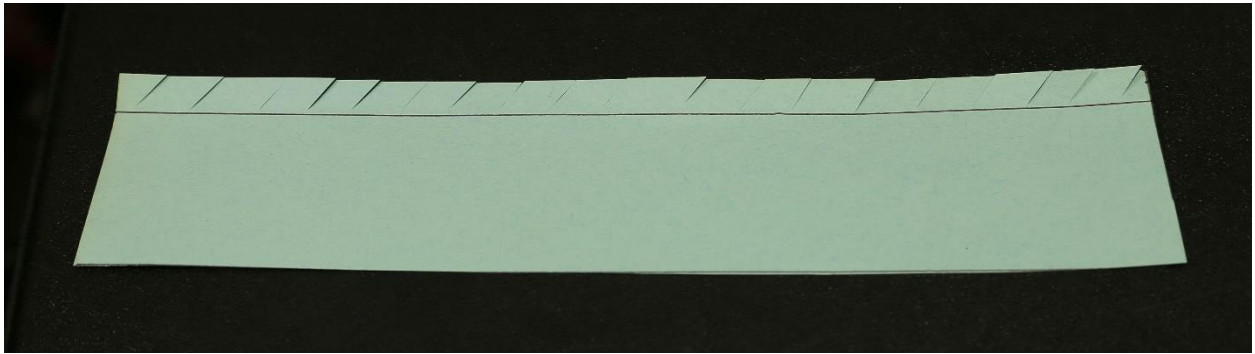




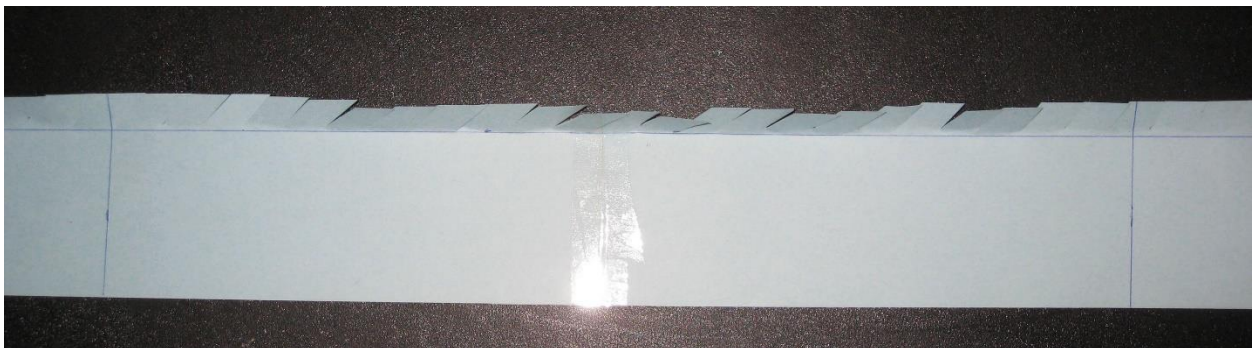
Lay the string lengthwise and cut the paper to length.



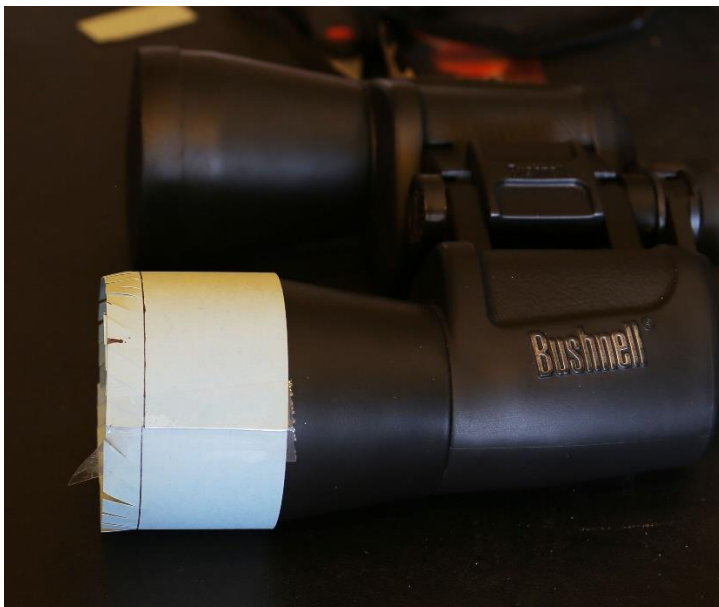
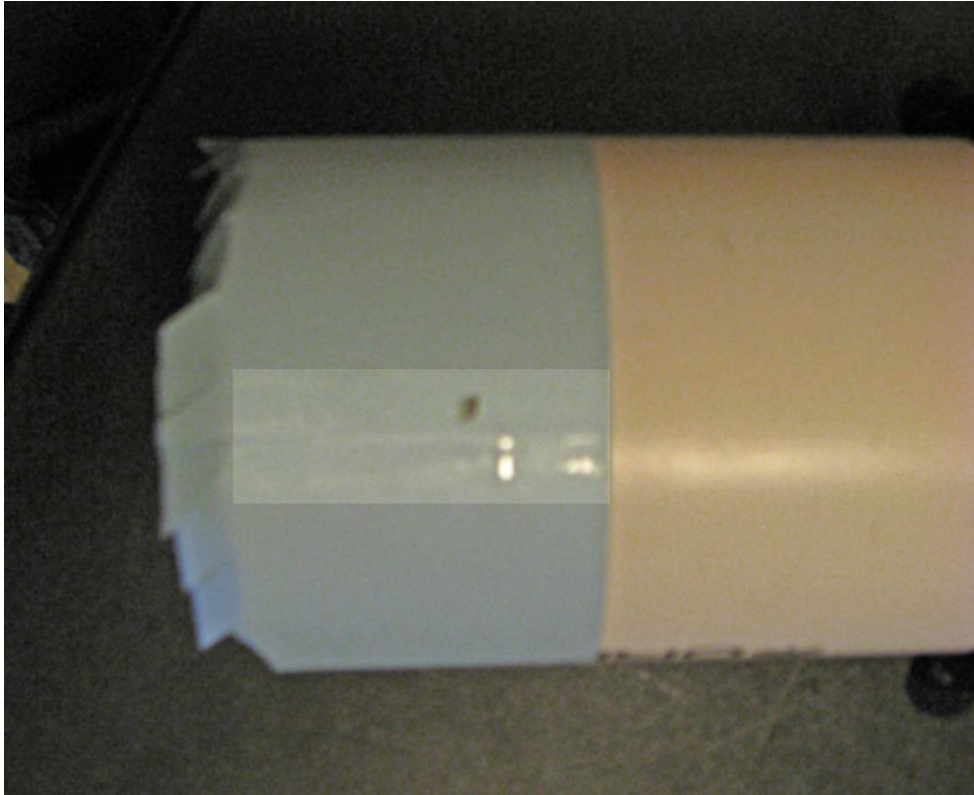
Then draw a line lengthwise about a half inch from the edge. Make diagonal cuts the length of the paper.



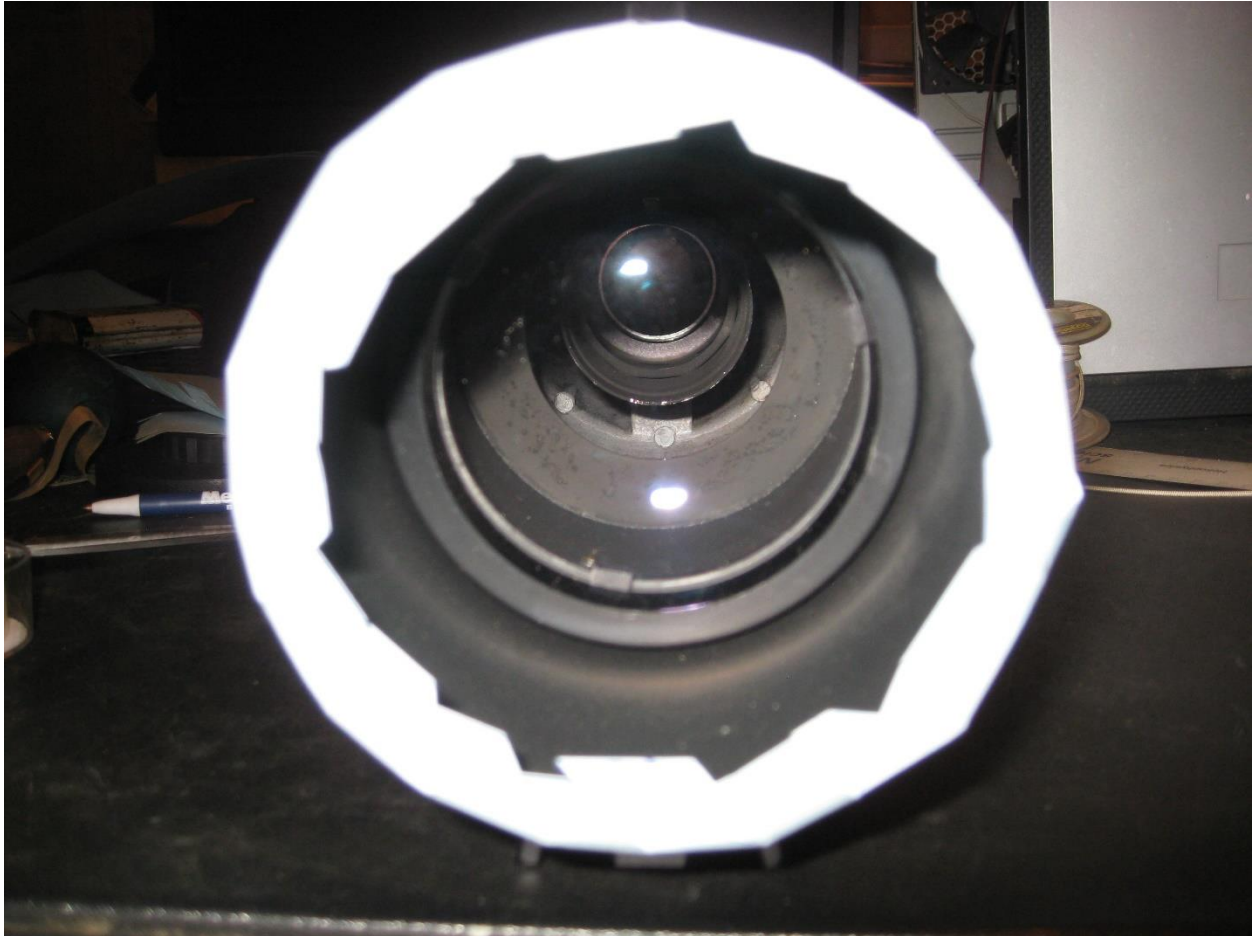
For the telescope, I had to tape two sheets together, with about a one inch overlap, taping both sides. I measured the paper with the taped portions in the center.



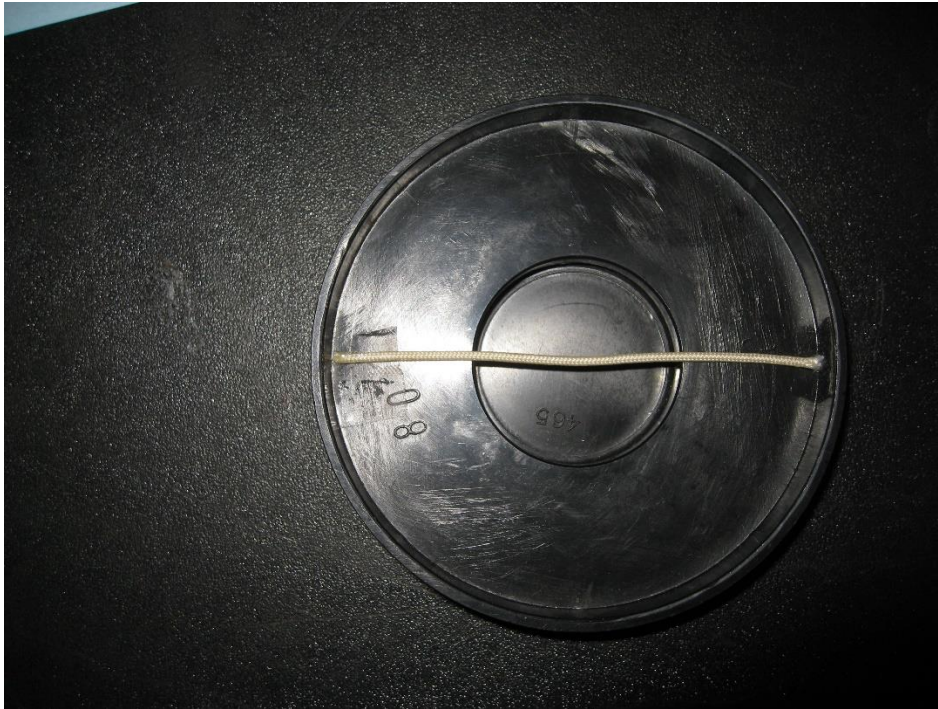
Wrap the paper around the tube of the piece, with the diagonal cuts extending over the front, making it tight enough so it slides on and off with resistance. If it's too tight you'll have problems getting it on and off, but it has to be tight enough to not fall, or blow off. Then tape it, inside and out



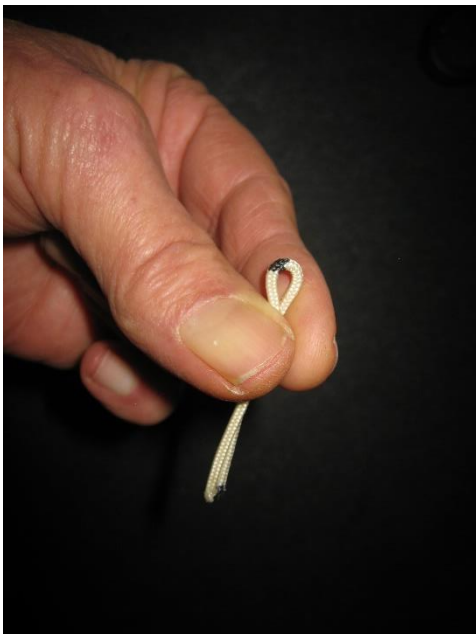
Place the paper tube on the piece and fold the cut tabs parallel to the lens.



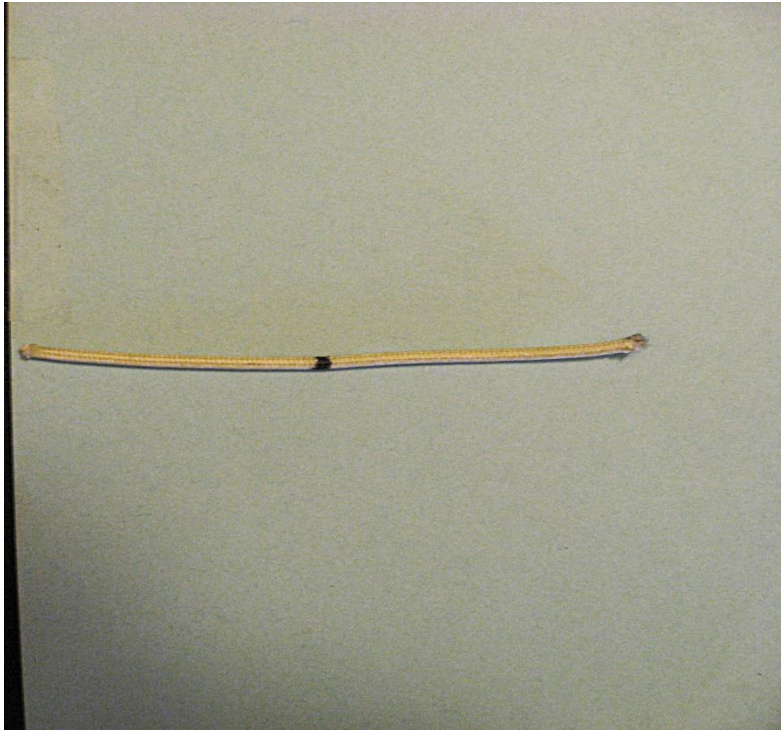
If you are using a telescope with a dust cap, or binoculars, you can cut a piece of string to the width of the inside of the cap. If you are using a camera lens, the measurement should be equal to the widest part of the lens covered by the filter tube.



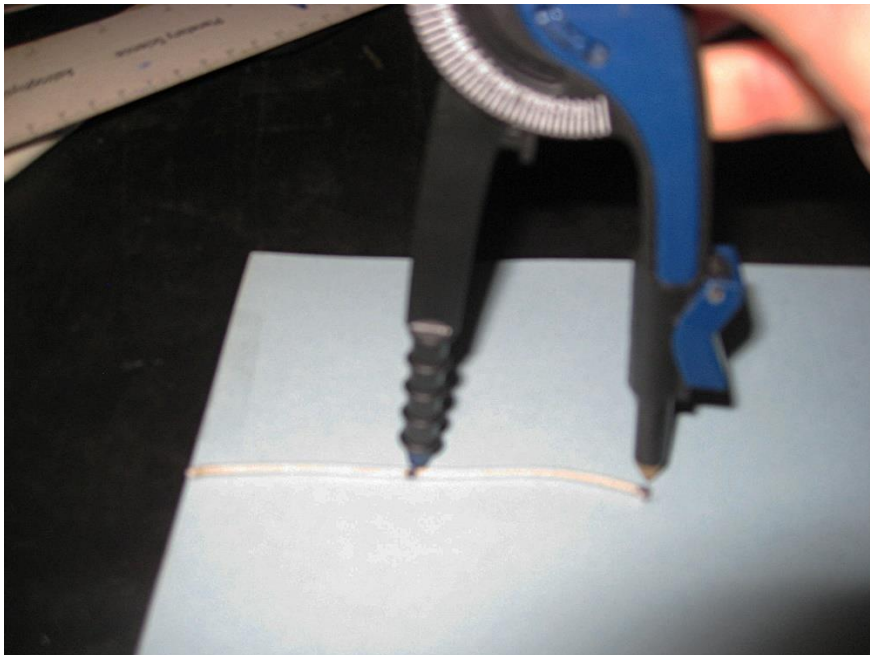
Fold the string with the two ends together, pinch the looped end and mark the center.



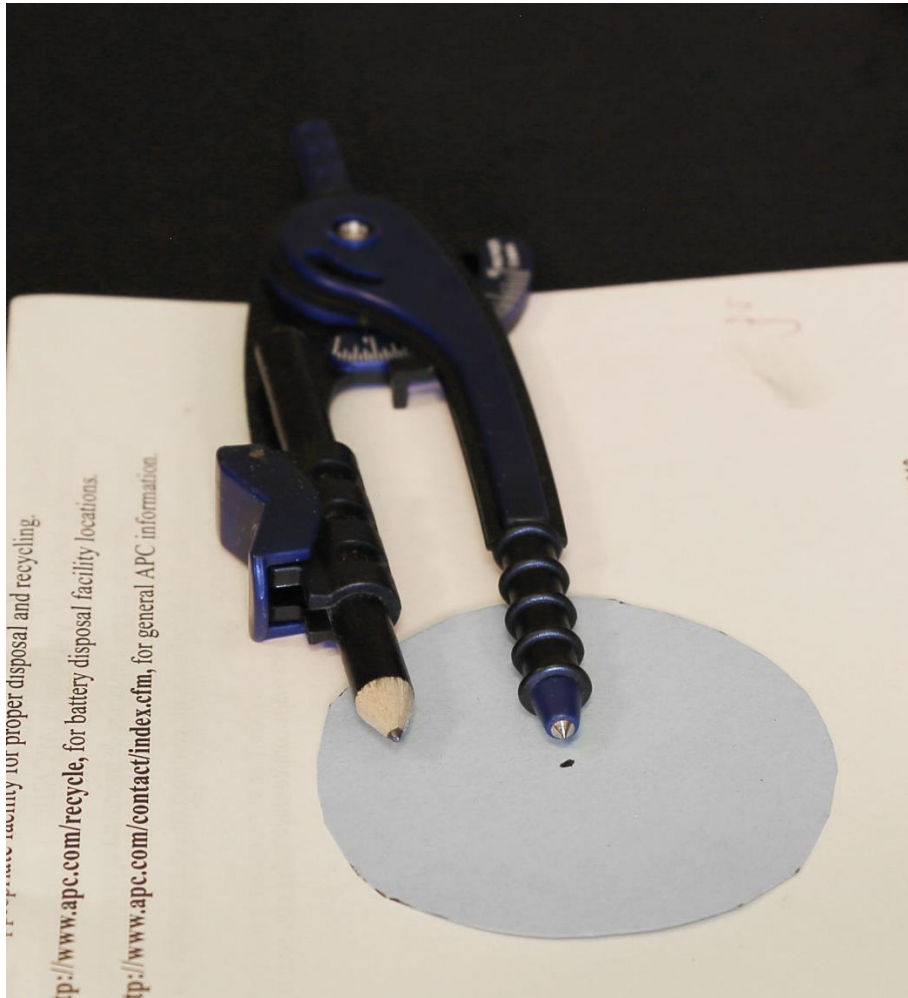
Using the leftover part of your cover stock, lay the string across and mark the center point.



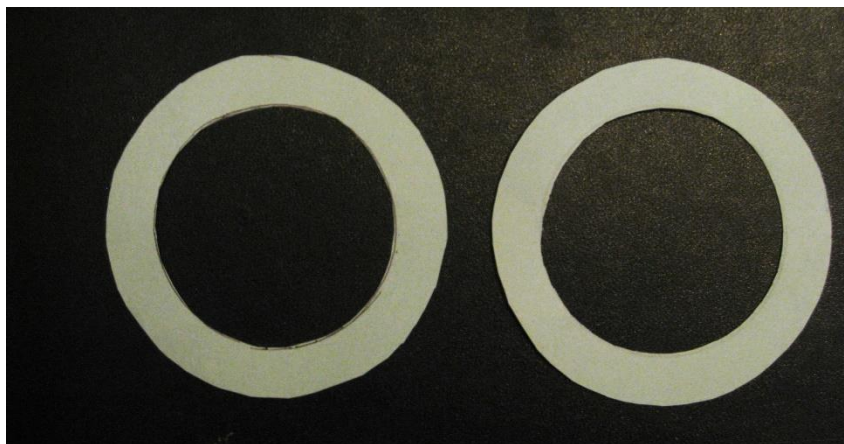
Use the protractor to draw a circle, from the center of the length of the string. Cut the circle. You will need to do two of these.



From the center point, draw a circle about a half inch from the edge.



Cut the center of the circle out. You now have two rings.

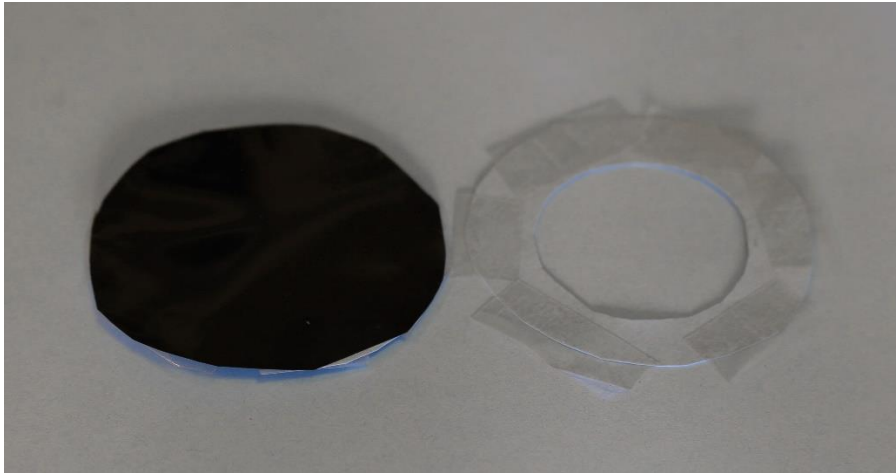


Using one of the rings, lay the ring on top of the solar filter material, so the edge of the ring is on two flat sides of the solar material. Using small pieces of tape, tape the ring to the filter material. It's easiest to cut the material into a square first, then cut around the ring. Be careful to handle the solar material on the outside edges only. Once it's cut, remove the tape.





Next, apply the double-sided tape, all the way around, to one side of the rings. Place the solar material on a sheet of paper, or paper towel. Place the ring on to the filter material with taped side toward the filter material. Press the ring firmly to the filter material. Flip it over and repeat the process with the other taped ring.



Next, make sure that you can place the filter inside the tube without it folding or bending. You may have to trim the outside to make it fit. Be careful not to touch the filter material. You could use the double-sided tape, but I prefer using a small amount of glue towards the outside of the ring, with the silver side up.



With the tape or glue side down, place the filter inside the tube, shiny side out, Use something with a blunt end to firmly press the filter in place.

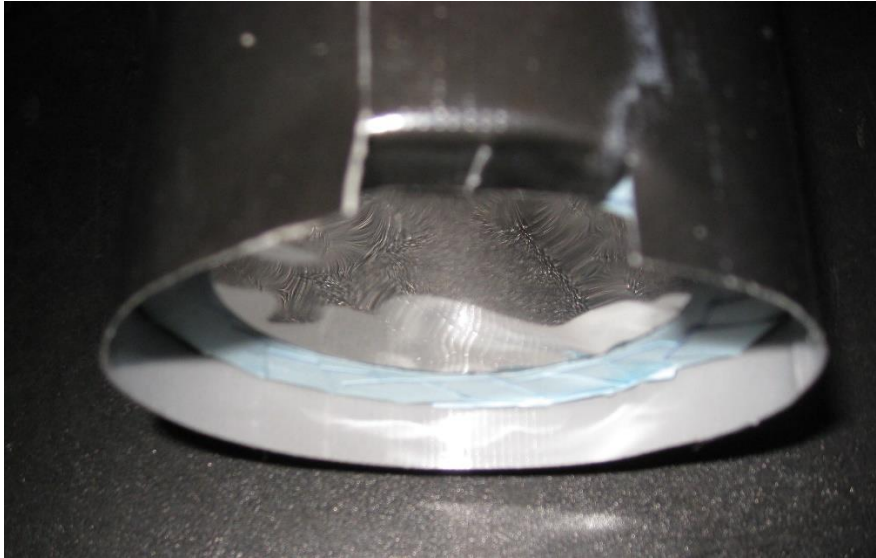


If you used tape, the following doesn't apply. If you are using a telescope, you can place the filter on the scope and place the filter down, using the weight of the scope to press on the filter to allow the glue to dry. It's best not use a camera lens this way, because any excess glue could stick to the lens cap. With the filter side down place something flat across the open end and put something relatively heavy on top. Big meteorites work well. 😊



The next step isn't absolutely necessary, but it does add structural integrity to the filter and blocks any possible light through the paper.

With the filter on the scope, binoculars or eyepiece, wrap black duct tape around the filter, overlapping slightly, leaving about a half inch overhang in front of the scope. Then cut strips so you can fold the tape over the end of the filter.



If the filter fits loosely, you can fold tape over the open end of the tube, to make it fit more snugly. Always hold the filter up to the light to check for pinholes. If you see light don't use the filter.



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Mike Romine