Home experiment: Sunspot viewer.

In this experiment you will construct simple apparatus that can be used to view the surface of the Sun and to track the movement of sunspots across the surface. You will also measure the diameter of the Sun.

This based on an activity from National Geographic at
https://www.nationalgeographic.org/activity/build-a-sunspot-viewer/

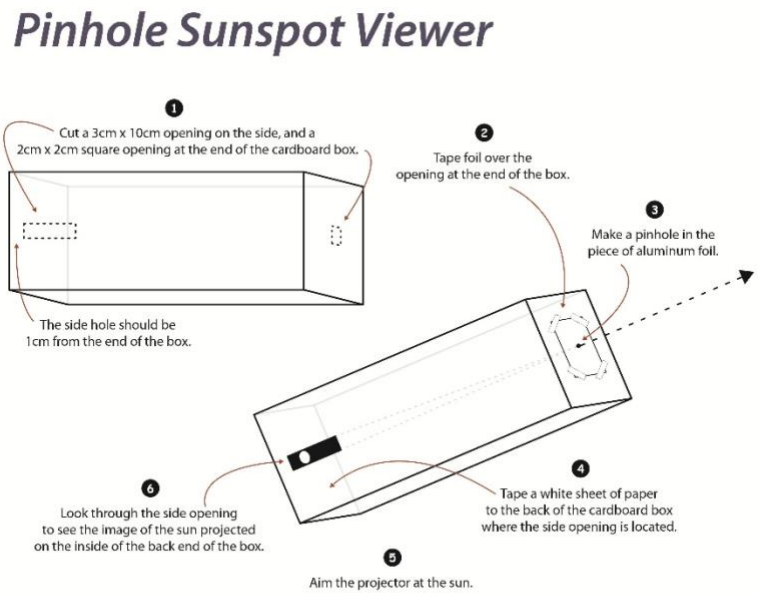
SAFETY: Never look directly at the sun. You can cause irreversible damage to their eyes without using the proper equipment and techniques to view the sun.

Materials required

- Aluminum foil
- Pencil
- Ruler
- Sewing needles or pin
- Shoebox or 2-foot rectangular cardboard box (the longer the better)
- Transparent tape
- White paper
- Scissors

Instructions (*also refer to the diagram below*)

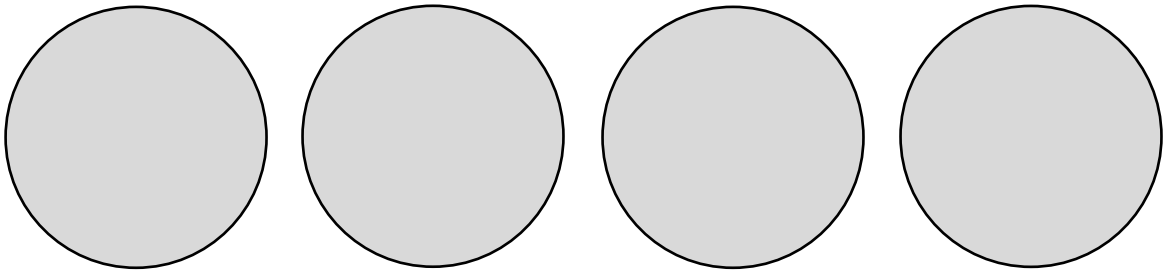
1. Take the cardboard box and cut a 2 centimeter x 2 centimeter hole at one end.
2. Tape a piece of aluminum foil over the hole, making sure it is taut.
3. Carefully use a pin or sewing needle to poke a hole into the foil.
4. At the opposite **side** of the box, cut a small window about 1 centimeter from the end. The window should be no larger than 10 centimeters x 3 centimeters. Make sure that the window is no wider than the side of the box.
5. Tape a piece of white paper to the inside of the box. This is your viewing screen.
6. Aim the pinhole side of the projector at the sun adjusting it slightly until you have the image of the sun on your screen. It will appear to be a white disk.



CAUTION : Never look directly at the sun when aiming the projector.

Activities

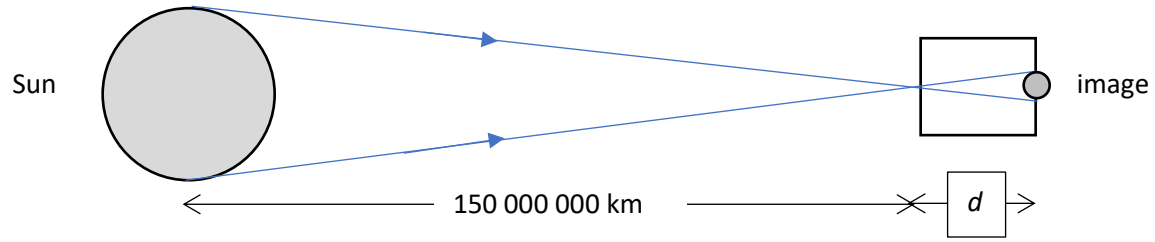
1. **Observing sunspots and measuring the rotation of the Sun.** Look at the projected image of the Sun on the screen and try to locate sunspots or sunspot groups. These will appear as small dark dots on the image. Mark their position(s) on the first diagram below and record the date of your observations below the diagram.



Repeat these observations every few days (observations 4-5 days apart is good) recording the dates in the table above.

The sunspots move because the Sun rotates and the sunspots move with it. Use your observations to work out roughly how long it takes for the Sun to rotate once on its axis.

2. **Size of the Sun.** Measure the diameter of the image of the Sun on your screen. The distance of the Sun is 150 000 000 km. We can use similar triangles to work out the diameter of the Sun.



The ratio of the diameter of the Sun to the diameter of the image is equal to the ratio of the distance to the Sun to the length of the box.

Use the equation below with your values for the diameter of the image and the length of the box (both in cm) to work out the diameter of the Sun.

Diameter of Sun = (150 000 000 km ×diameter of image) ÷ length of box (*d*)

How does your answer compare with the real value of: 1 400 000 km?

The NASA SOHO satellite publishes daily images and movies of sunspot activity. You can see them here:

https://sohowww.nascom.nasa.gov/sunspots/