

## Viewing Sunspots

### **Overview:**

Students use a sun projector to safely view sunspots. Students sketch the projected image of the sun, and include visible dark spots.

### **Objectives:**

The student will:

- build a sun projector; and
- identify sun spots.

### **Materials:**

- Binoculars or a telescope
- Mirror (optional)
- Tripod or other stable surface
- Wall or screen
- Paper
- Tape
- STUDENT WORKSHEET: “Viewing Sunspots”

### **Answers to Student Worksheet:**

1. *Sketches will vary. Sunspots should be labeled. Dotted outline should be offset from original.*
2. *Sunspot*
3. *Answers will vary.*

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### *Activity Procedure:*

1. Conduct this activity on a clear day either outside or in a classroom with a window facing the sun. Darken the room as much as possible, and then set up the sun image projector as shown below. *The mirror shown in the diagram is optional. Reflecting the image off of a mirror will enlarge the image, but may make it too dark to see.*
2. Begin by cutting out a cardboard mask with an opening for one lens of the binoculars (the large lens on the side opposite the eyepiece). Tape the mask to the binoculars.
3. Place the binoculars on a tripod or other stable surface, so they remain steady during sun viewing. Point the binoculars at the sun. A bright spot should form on the floor or wall.

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**Teacher’s Note:** If the binoculars produce a faint image of the sun, try covering a table with a dark blanket to create a darker area on which to project. Make a small hole for the binoculars to peek through and tape a piece of paper to the floor on which the image can be projected. Students can crawl under the table to view the sun image.

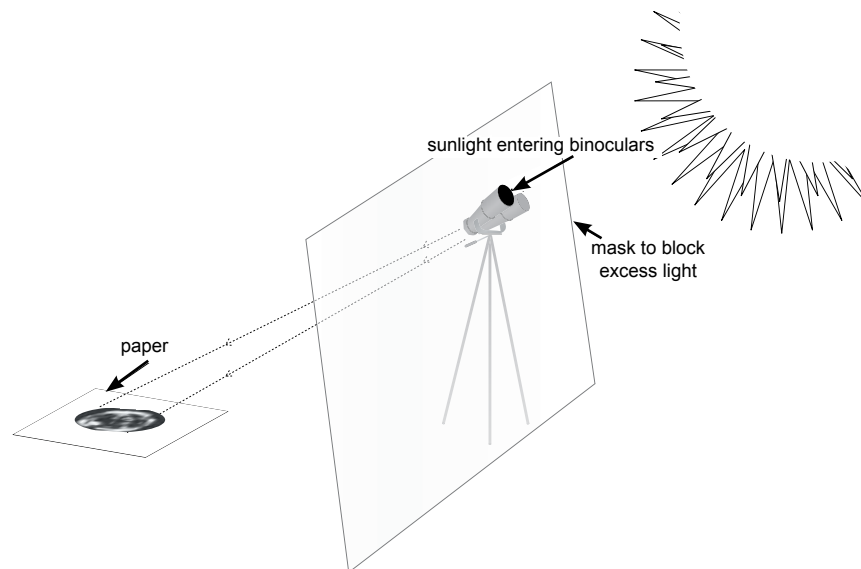
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4. Place a piece of paper (or a mirror) in the place where the image of the sun forms. If using a mirror, tape paper to the wall where the sun’s image is reflected. Focus the image of the sun on the piece of paper. If necessary, put cardboard behind the paper and hold it at an angle to make the sun image round. Tape the paper (and cardboard) in place.
5. Ask a student to trace around the sun’s image and mark the locations of all dark spots. Repeat this process 10 minutes later. Distribute the STUDENT WORKSHEET: “Viewing Sunspots” and ask students to complete it. Ask students to share their findings.

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**Inquiry Extension:** Repeat this activity 1 or 2 days later, asking students to sketch again the outline of the sun and the location of sunspots. Ask students to compare these sketches to their previous ones to figure out which direction the sun is rotating.

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Name: \_\_\_\_\_

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**Directions:** While making observations more than 400 years ago, the astronomer Galileo looked directly at the sun. As a result, he suffered permanent eye damage. The first thing to remember about making solar observations is NEVER to look directly at the sun. To safely view the sun, use binoculars to project an image of the sun onto a piece of paper. Please use the sun image to answer the questions below.

1. Sketch the sun image below, drawing and labeling sunspots. Wait 10 minutes, then draw a dotted line to show how the sun image has moved.

2. What is the name of a dark spot on the sun's surface? \_\_\_\_\_

3. Why did the sun image shift?

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