



Name: _____ Date: _____ Class: _____

Title: How to Safely Observe a Solar Eclipse
Student Sheets

1. **Gather Background Knowledge:** A solar eclipse occurs when the Moon is between the Sun and Earth, and with the right conditions, the Moon casts a shadow on Earth's surface. Observers experience different types of solar eclipses, depending on what part of the Moon's shadow the observer is in.

2. **Analyze Data:** The United States will experience all three types of solar eclipses in the coming years! There will be an annular solar eclipse on October 14, 2023 and a total solar eclipse on April 8, 2024. Examine the US map, showing the paths of these two solar eclipses. Just like there is a path of totality for a total solar eclipse, there is a path of annularity for an annular solar eclipse. You must be on the path of annularity to experience what scientists refer to as the "ring of fire." People experiencing an annular solar eclipse still need to keep their solar eclipse glasses on the entire time. Everyone outside of the paths will experience a partial solar eclipse, which you also need solar eclipse glasses to view.
 - What is your location?

 - Will you be in the path for either eclipse?
 - If so, approximately how long will totality or annularity last at your location?

 - If you will experience a partial solar eclipse, how much of the Sun will be obscured at your location for each type of eclipse?



Name: _____ Date: _____ Class: _____

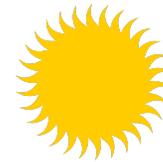
3. **Making plans to safely explore the Sun. Always use the proper safety equipment to observe the Sun.** Solar filters are 1000 times darker than sunglasses and block all infrared and UV light, and nearly all visible light. If you don't have solar eclipse glasses or a solar filter for your telescope or binoculars, there are **indirect ways** to safely observe the Sun, like using a **pinhole projector**.



View the eclipse with special eclipse glasses.



Regular sunglasses are not safe to view the eclipse.



Pinhole projector

A safe way to view the solar eclipse

With your back facing the sun, raise a paper plate with a small hole punched in it.

Aim the beam from the hole onto another piece of cardboard.

The farther away you hold your pinhole, the bigger the projected image will be.



SOURCE: NASA



AP

Image source: Times Union

Safety Reminder: Keep your back to the Sun when using a pinhole projector.



Name: _____ Date: _____ Class: _____

4. Get ready for 2023:

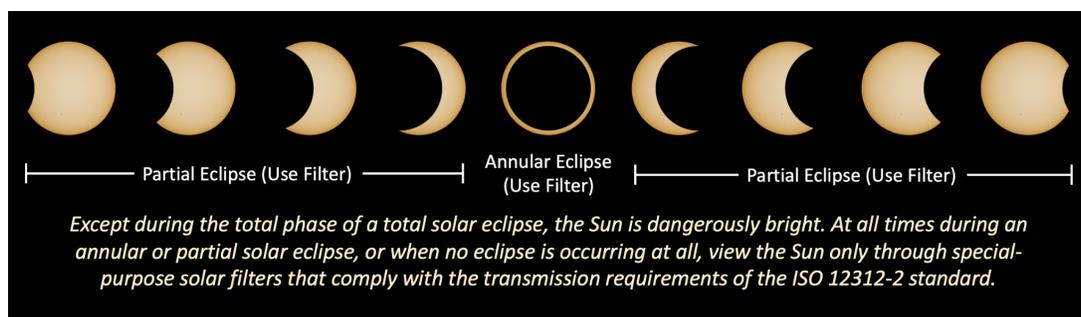
a. 2023 Plan A: Indirect Viewing. Use a pinhole projector to indirectly view the solar eclipse.

- Your back should be to the Sun when using a pinhole projector.
 - Cut out this pinhole projector of the 2023 Annular Solar Eclipse US Map.
 - Hole-punch a circle in the middle of the map and a star over Washington DC.
 - Choose one other shape and punch a hole where you live.
- Make a prediction: Have students predict what shape will the Sun be when it is projected through the holes.
 - Times not during an eclipse (regular Sun)?

 - During a partial eclipse?

 - During an annular eclipse?

b. 2023 Plan B: Direct Viewing: Use solar eclipse glasses to directly view the solar eclipse. Examine the following graphic about how to properly use solar eclipse glasses during an annular solar eclipse.



Credit: American Astronomical Society



Name: _____ Date: _____ Class: _____

- For observers experiencing an annular solar eclipse, when do you need to use solar eclipse glasses?
- For observers on the 90% line (path of annularity)?
- For observers experiencing a partial solar eclipse (80%, 60%, 40%, 20%)?

5. Get ready for 2024:

a. (Optional) **2024 Plan A: Indirect Viewing: Repeat the procedure for the pinhole projector of the 2024 Total Solar Eclipse US Map.**

- i. Make a prediction: What will you see using a pinhole projector during totality?

b. **Plan B: Direct Viewing: Use solar eclipse glasses to directly view the solar eclipse.** Examine the following graphic about how to properly use solar eclipse glasses during a total solar eclipse.



Credit: American Astronomical Society

- i. For observers experiencing a total solar eclipse, when do you need to use solar eclipse glasses?



Name: _____ Date: _____ Class: _____

- ii. For observers on the 100% line (path of totality)?

- iii. For observers experiencing a partial solar eclipse, near the 100% line, but only at 95%?

- iv. For observers experiencing a partial solar eclipse, on the 80% lines? *The entire time.*

- v. For observers experiencing a partial solar eclipse, on the 60% line?

- vi. For observers experiencing a partial solar eclipse, on the 40% line?