OFFICE OF ENVIRONMENTAL HEALTH & SAFETY

SAFETY ALERT

No. 17-02	SOLAR ECLIPSE VIEWING PRECAUTIONS	August 2017 Rev. March 2024

On Monday April 8, 2024, a total solar eclipse will be visible across North America, passing over Mexico, United States and Canada. Weather permitting, the entire continent will have the opportunity to view the eclipse as the moon passes in front of the sun, casting a shadow on the Earth's surface. The eclipse will first be visible in North America at 11:07 a.m. PDT starting in the Mexican Pacific Coast and end at 5:16 p.m. NDT in Western Canada. The next solar eclipse that can be seen from the United States will be on August 23, 2044.

A total solar eclipse will not be visible from California, meaning that a portion of the sun will still be visible even as the eclipse reaches its peak. Special safety precautions must be taken by those viewing any phase of the eclipse. The following is an excerpt from the National Aeronautics and Space Administration's (NASA) guidelines for the safe viewing of the eclipse:

The only safe way to look directly at the uneclipsed or partially eclipsed sun is through special-purpose solar filters, such as "eclipse glasses" or hand-held solar viewers. Homemade filters or ordinary sunglasses, even very dark ones, are not safe for looking at the sun; they transmit thousands of times too much sunlight. Refer to the American Astronomical Society (AAS) Reputable Vendors of Solar Filters & Viewers page for a list of manufacturers and authorized dealers of eclipse glasses and handheld solar viewers verified to be compliant with the ISO 12312-2 international safety standard for such products.

DISTRIBUTION: Schools and Offices

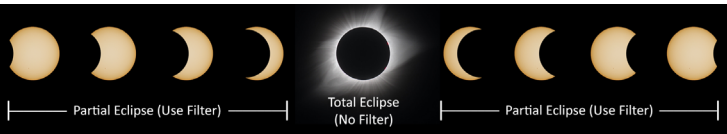
- Always inspect your solar filter before use; if scratched or damaged, discard it. Read and follow any instructions printed on or packaged with the filter.
- Always supervise children using solar filters.
- Stand still and cover your eyes with your eclipse glasses or solar viewer before looking up at the bright sun. After looking at the sun, turn away and remove your filter — do not remove it while looking at the sun.
- Do not look at the uneclipsed or partially eclipsed sun through an unfiltered camera, telescope, binoculars, or other optical device.
- Similarly, do not look at the sun through a camera, a telescope, binoculars, or any other optical device while using your eclipse glasses or hand-held solar viewer — the concentrated solar rays will damage the filter and enter your eye(s), causing serious injury.
- Outside the path of totality, you must always use a safe solar filter to view the sun directly.
- If you normally wear eyeglasses, keep them on. Put your eclipse glasses on over them, or hold your handheld viewer in front of them.

For more safety and general information on the eclipse, please review the attached flyer or visit NASA's website on Total Solar Eclipse Safety. If you have additional questions, contact the Office of Environmental Health & Safety at (213) 241-3199 or at http://achieve.lausd.net/oehs.

DISTRIBUTION: Schools and Offices

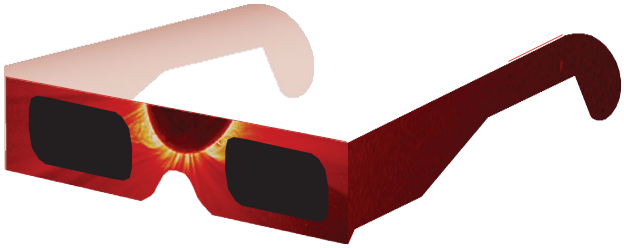
How to Safely View the April 8, 2024, TOTAL SOLAR ECLIPSE

A solar eclipse occurs when the Moon blocks any part of the Sun. On Monday, April 8, 2024, a solar eclipse will be visible in North and Central America, as well as parts of Europe and South America. All 50 U.S. states (excluding most of Alaska) will have a chance to see at least a partial solar eclipse. In a narrow track across Mexico, the U.S. from Texas to Maine, and Canada from Ontario to Newfoundland, the Moon will completely cover the Sun's bright face, producing a spectacular total solar eclipse.



A total solar eclipse is about as bright as a full Moon — and just as safe to look at. But the Sun at any other time is dangerously bright. View it only through special-purpose solar filters that comply with the transmittance requirements of the ISO 12312-2 international standard for filters for direct solar viewing.

Protect Your Eyes



- Looking directly at the Sun without proper eye protection is unsafe EXCEPT during the brief total eclipse phase ("totality"). This happens ONLY within the narrow path of totality. At all other times, it is safe to look directly at the Sun ONLY through special-purpose solar filters, such as "eclipse glasses," that comply with the transmittance requirements of the ISO 12312-2 international standard. Ordinary sunglasses, even very dark ones, are not safe for looking at the Sun.
- If you are inside the path of totality on April 8, 2024, remove your solar filter ONLY when the Moon completely covers the Sun's bright face. As soon as the Sun begins to reappear, replace your solar filter to look at the remaining partial phases.
- Outside the path of totality, there is NO TIME when it is safe to look directly at the Sun without using a solar filter that complies with the transmittance requirements of the ISO 12312-2 international standard.

Instructions for the Safe Use of Solar Filters and Viewers

- Always inspect your solar filter before use; if scratched, punctured, torn, or otherwise damaged, discard it. Read and follow any instructions printed on or packaged with the filter.
- Always supervise children using solar filters.
- If you normally wear eyeglasses, keep them on. Put your eclipse glasses on over them or hold your handheld viewer in front of them.
- Stand still and cover your eyes with your eclipse glasses or solar viewer before looking at the bright Sun. After looking at the Sun, turn away and remove your filter – do not remove it while looking at the Sun.

- Do not look at the uneclipsed or partially eclipsed Sun through an unfiltered camera, telescope, binoculars, or other optical device. Do not do so even while wearing eclipse glasses or using a handheld solar viewer in front of your eyes – the concentrated solar rays could damage the filter and enter your eyes, causing serious injury.
- Solar filters must be securely attached to the front of any telescope, binoculars, or camera lens. Seek expert advice from an astronomer before using a solar filter with a camera, telescope, binoculars, or any other optical device.

What If You Don't Have a Safe Solar Filter or Viewer?

Another method for safe viewing of the partially eclipsed Sun is indirectly via pinhole projection. For example, with your back to the Sun, cross the outstretched, slightly open fingers of one hand over the outstretched, slightly open fingers of the other, creating a waffle pattern. In your hands' shadow on the ground, the spaces between your fingers will show the Sun as crescents.

A solar eclipse is one of nature's grandest spectacles. By following these simple rules, you can safely enjoy the view and be rewarded with memories to last a lifetime. For more information about eye safety and the eclipse, visit https://eclipse.aas.org/eye-safety.

This safety information has been endorsed by the American Astronomical Society, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, the U.S. National Science Foundation, the American Academy of Ophthalmology, the American Academy of Optometry, and the American Medical Association.

NP-2023-11-189-GSFC

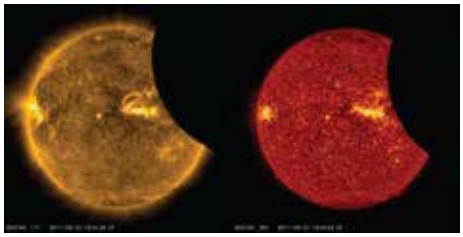
National Aeronautics and Space Administration

Experience the Total Solar Eclipse

Monday, April 8, 2024

2024 Total Solar eclipse
THROUGH THE EYES OF NASA

WHY DOES NASA STUDY ECLIPSES?



Credit: NASA/SDO

Eclipses aren't just beautiful–they're great for science. For over a century, solar eclipses helped scientists decipher the Sun's structure and explosive events, find evidence for the theory of general relativity, and discover helium. Today eclipses help NASA predict the structure of the Sun and its impact on Earth. Total eclipses are a unique opportunity to study the Sun because they allow scientists to see a part of the Sun's atmosphere – known as the corona – that is key to answering fundamental questions about how heat and energy are transferred from the Sun out into the solar wind, the constant stream of particles that the Sun scatters into the solar system.

WHAT IS A TOTAL SOLAR ECLIPSE?

For a **total solar eclipse** to take place, the Sun, Moon, and Earth must be in a direct line. The people who see the total eclipse are in the center of the Moon's shadow when it hits Earth. The sky will darken, as if it were twilight. Weather permitting, people in the path of a total solar eclipse can see the Sun's corona, the outer atmosphere of the Sun. A total solar eclipse is the only type of solar eclipse where viewers can watch without their eclipse glasses – and they can only remove them when the Moon is completely blocking the Sun.

A **partial eclipse** happens when the Sun, Moon, and Earth are not exactly lined up. Only a part of the Sun will appear to be covered. During a total or annular solar eclipse, people outside the Moon's inner shadow see a partial solar eclipse.

Credit: AAS

SAFETY

Except during the total phase of a total solar eclipse, do not look at the Sun without special eye protection. BEFORE EACH USE: Check the front and back of each lens for damage such as scratches, pinholes, or separation from the frame. DO NOT USE IF DAMAGED! Cut glasses into small pieces and discard. DO NOT attempt to clean or disinfect eclipse glasses except with a soft, dry, nonabrasive tissue or cloth.

You can see the Sun and an eclipse with special eclipse or solar viewing glasses. NEVER look directly at the uneclipsed or partially eclipsed Sun without appropriate eye wear. Sunglasses are not safe to view an eclipse. For more information, visit: **go.nasa.gov/EclipseEyeSafety**

ECLIPSES THROUGH THE EYES OF NASA

On April 8, 2024, a total solar eclipse will cross North America creating a path of totality.

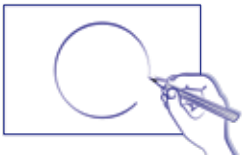
Credit: Michala Garrison and the Scientific Visualization Studio (SVS), in collaboration with the NASA Heliophysics Education Activation Team (NASA HEAT), part of NASA's Science Activation portfolio. Eclipse calculations by Ernie Wright, NASA Goddard Space Flight Center.

To find out where to watch, how to watch, and eclipse duration in your area, explore **go.nasa.gov/Eclipse2024**

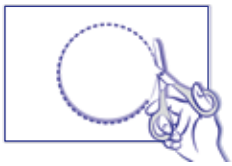
PREDICT THE CORONA

Long before there were cameras or telescopes, eclipse watchers recorded what they saw in the sky in words, drawings, and paintings. Now NASA scientists use instruments like coronagraphs to study eclipses to make new discoveries about the Sun, Earth, and our space environment. You can have fun creating your own picture of a solar eclipse with chalk, paper, and scissors! You can do this activity before an eclipse to predict what you'll see, or after to record what you saw.

First, trace a large circle template on stiff paper.



Carefully cut out the circle.

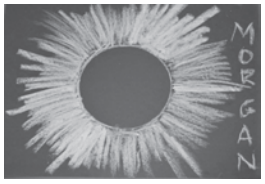


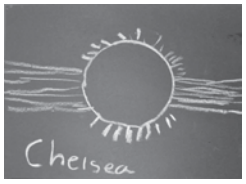
Place the template on dark paper and hold or tape it down. Draw a thick circle or lines with chalk around the template a few times – it doesn't need to be neat!

Holding the template in place, smudge the chalk away from the center of the circle using a finger to create the corona of the Sun.

When you are done smudging, remove the circle template and add words, pictures, or fun designs.

You've made total solar eclipse art!





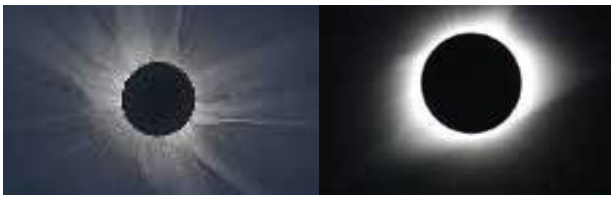
The whole family can get involved in learning about eclipses! Morgan (age 11) and Chelsea (age 8) drew these dazzling coronas.

Compare your coronagraph art to that of early to modern scientists. Which does yours most closely resemble?

Left: Drawing of the 1860 solar eclipse. Credit: G. Tempel
Center: A coronagraph simulates a solar eclipse, blocking the Sun to reveal its outer atmosphere. Credit: NASA/ESA SOHO
Right: Ancient rock art in Chaco Canyon may depict a total solar eclipse in 1097. Credit: National Park Service

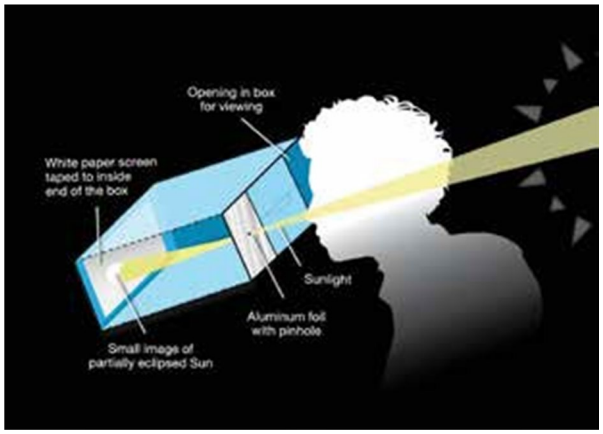
Download this activity and the Predict the Corona Cake Art extension at **science.nasa.gov/learn/heat/resource/predict-the-corona-activities**

EXPECTATION VS REALITY



The left image is a highly processed composite, assembled using a multitude of images. One may expect to see something like this; however, it is unrealistic for direct viewing. Credit: S. Habbel, M. Druckmüller, and P. Aniol. The right image is more representative of what you could expect to see if you were in the path of totality. Credit: NASA/Nat Gopalswamy. We suggest taking in this awe-inspiring moment without a device in front of you.

MAKE YOUR OWN ECLIPSE PROJECTOR



Credit: NASA

You can make this simple eclipse projector with almost any cardboard box, paper, tape, and foil. The longer the distance from the pinhole to screen, the larger the image of the Sun will be.

Credit: NASA HEAT/J. Patrick Haas

Pinhole projectors allowed early scientists to view the shapes of illuminated objects, like the Sun, by shining the light from the object through a very small hole, projecting the image of the object onto the ground, wall, or other flat surface. These are a great method for safe solar viewing. Be sure that when using, the Sun is always behind you. Explore the 2D paper cut and 3D printed versions of the total eclipse pinhole projectors and activity.
Find More: nasa3d.arc.nasa.gov/detail/usa-eclipse-2024

HELIOPHYSICS BIG YEAR

Learn more about the Heliophysics Big Year: October 2023 to December 2024

Find More: go.nasa.gov/HelioBigYear

Updated resources for eclipse safety, NASA science, and history.

Find More: go.nasa.gov/Eclipse2024

This product is supported by the NASA Heliophysics Education Activation Team (NASA HEAT), part of NASA's Science Activation portfolio.