How to View the 2017 Solar Eclipse Safely

Looking directly at the sun is unsafe except during the brief total phase of a solar eclipse ("totality"), when the moon entirely blocks the sun's bright face, which will happen only within the narrow path of totality (https://go.nasa.gov/2pC0lhe (link is external)).

The only safe way to look directly at the uneclipsed or partially eclipsed sun is through special-purpose solar filters, such as "eclipse glasses" (example shown at left) 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 (link is external)** 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.

- 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.
- Seek expert advice from an astronomer before using a solar filter with a camera, a telescope, binoculars, or any other optical device. Note that solar filters must be attached to the *front* of any telescope, binoculars, camera lens, or other optics.

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If you are within the path of totality (https://go.nasa.gov/2pC0lhe (link is external)), remove your solar filter only when the moon completely covers the sun's bright face and it suddenly gets quite dark. Experience totality, then, as soon as the bright sun begins to reappear, replace your solar viewer to look at the remaining partial phases.
- 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.

Note: If your eclipse glasses or viewers are compliant with the ISO 12312-2 safety standard, you may look at the uneclipsed or partially eclipsed Sun through them for as long as you wish. Furthermore, if the filters aren't scratched, punctured, or torn, you may reuse them indefinitely. Some glasses/viewers are printed with warnings stating that you shouldn't look through them for more than 3 minutes at a time and that you should discard them if they are more than 3 years old. *Such warnings are outdated and do not apply to eclipse viewers compliant with the ISO 12312-2 standard adopted in 2015.* To make sure you get (or got) your eclipse glasses/viewers from a supplier of ISO-compliant products, see the American Astronomical Society (AAS) **Reputable Vendors of Solar Filters & Viewers (link is external)** page.

An alternative method for safe viewing of the partially eclipsed sun is pinhole projection (link is external). For example, cross the outstretched, slightly open fingers of one hand over the outstretched, slightly open fingers of the other, creating a waffle pattern. With your back to the sun, look at your hands' shadow on the ground. The little spaces between your fingers will project a grid of small images on the ground, showing the sun as a crescent during the partial phases of the eclipse. Or just look at the shadow of a leafy tree during the partial eclipse; you'll see the ground dappled with crescent Suns projected by the tiny spaces between the leaves.

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. More information:

eclipse.aas.org (link is external) **eclipse2017.nasa.gov**

This document does not constitute medical advice. Readers with questions should contact a qualified eye-care professional.

Additional Safety Information

An eclipse is a rare and striking phenomenon you won't want to miss, but you must carefully follow safety procedures. Don't let the requisite warnings scare you away from witnessing this singular spectacle! You can experience the eclipse safely, but it is vital that you protect your eyes at all times with the proper solar filters. No matter what recommended technique you use, do not stare continuously at the sun. Take breaks and give your eyes a rest! Do not use sunglasses: they don't offer your eyes sufficient protection. The only acceptable glasses are safe viewers designed for looking at the sun and solar eclipses. One excellent resource on how to determine if your viewers are safe can be found here: https://eclipse.aas.org/eye-safety/iso-certification (link is external)

Viewing with Protection -- Experts suggests that one widely available filter for safe solar viewing is welders glass of sufficiently high number. The only ones that are safe for direct viewing of the Sun with your eyes are those of Shade 12 or higher. These are much darker than the filters used for most kinds of welding. If you have an old welder's helmet around the house and are thinking of using it to view the Sun, make sure you know the filter's shade number. If it's less than 12 (and it probably is), don't even *think* about using it to look at the Sun.
Many people find the Sun too bright even in a Shade 12 filter, and some find the Sun too dim in a Shade 14 filter — but Shade 13 filters are uncommon and can be hard to find. The AAS Reputable Vendors of Solar Filters & Viewers page (link is external) doesn't list any suppliers of welder's filters, only suppliers of special-purpose filters made for viewing the Sun.To find out more about eyewear and handheld viewers go to https://eclipse.aas.org/eye-safety/eyewear-viewers (link is external).

Telescopes with Solar Filters – Eclipses are best viewed directly when magnified, which means a telescope with a solar filter or solar telescopes. These will give you a magnified view that will clearly show the progress of an eclipse. Never look through a telescope without a solar filter on the large end of the scope. And never use small solar filters that attach to the eyepiece (as found in some older, cheaper telescopes.) https://eclipse.aas.org/eye-safety/optics-filters (link is external)

Pinhole and Related Projection Methods (link is external) -- Pinhole projectors and other projection techniques are a safe, indirect viewing technique for observing an image of the sun. These provide a popular way for viewing solar eclipses. One viewing technique is to project an image of the sun onto a white surface with a projecting telescope. This is explained further here: http://www.astrosociety.org/education/publications/tnl/05/stars2.html (link is external)

The Exploratorium demonstrates how to view a planet in transit or an eclipse safely by projecting the image with binoculars: http://www.exploratorium.edu/transit/how.html (link is external). There are commercially available projection telescopes as well.

Besides eye protection during solar eclipse viewing, one needs to pay attention to their personal needs and surrounding. Below are some additional safety tips for eclipse observers before, during and after the August 21, 2017 solar eclipse.

Graphics-Only Solar Eclipse Safety Flyer


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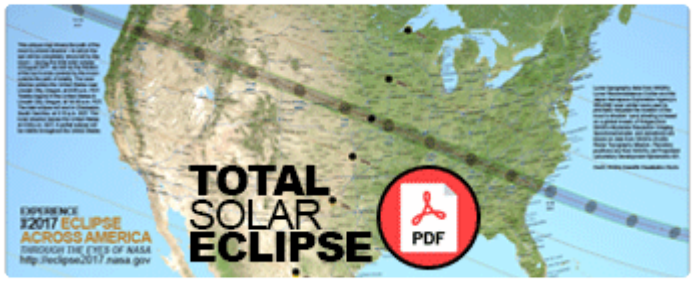
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WHEN? and HOW?


NASA'sEyes
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August 21, 2017
LIVESTREAM
Live Streaming Video

- Eclipse Interactive Map

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