

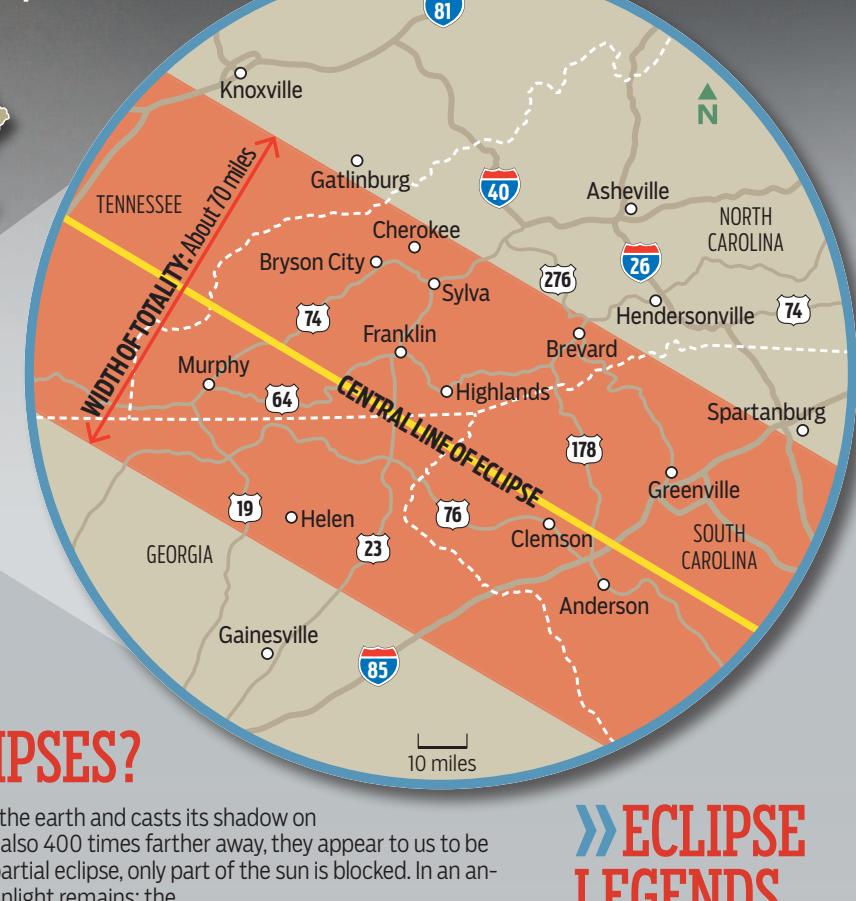
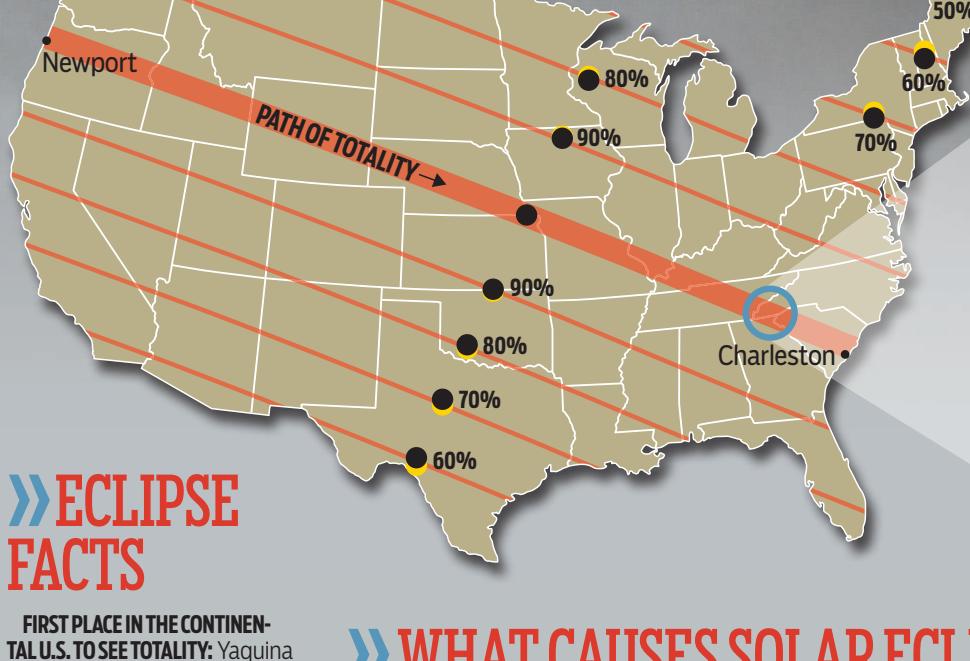
# ECLIPSE U.S.A.

On Monday, Aug. 21, a total solar eclipse will move across the entire continental United States. The last time that happened was in 1918, so there has been a lot of excitement about this one. There are about two or three solar eclipses a year, but most aren't total and many occur in isolated areas or over the ocean, so they seem rarer. The earth experiences about two total solar eclipses every three years. This eclipse's path of totality — when the moon fully blocks the sun — will cross the far southwestern part of North Carolina. Most of the rest of the state will see a partial eclipse of at least 90 percent. The eclipse's visit to North Carolina will be brief; totality will enter the state at 2:33 p.m. and exit at 2:49 p.m.

## Online

NASA will have live video of the eclipse from around the country at [nasa.gov/eclipselive](http://nasa.gov/eclipselive)

Western Carolina University, which is in the path of totality, will livestream the eclipse as part of a 45-minute educational program at [wcu.edu/solar-eclipse](http://wcu.edu/solar-eclipse). The eclipse will pass over the university at 2:35 p.m.



## » ECLIPSE FACTS

**FIRST PLACE IN THE CONTINENTAL U.S. TO SEE TOTALITY:** Yaquina Head near Newport, Ore., beginning at 10:15 a.m. Pacific

**LAST PLACE IN THE CONTINENTAL U.S. TO SEE TOTALITY:** Cape Roman Wildlife Reserve near Charleston, S.C., ending at 2:49 p.m.

**LAST TOTAL SOLAR ECLIPSE IN NORTH CAROLINA:** March 7, 1970

**NEXT TOTAL SOLAR ECLIPSE IN NORTH CAROLINA:** May 11, 2078

**NEXT SOLAR ECLIPSE ANYWHERE IN THE WORLD:** Across southern South America on July 2, 2019

**AVERAGE SPEED OF THE MOON'S SHADOW ACROSS NORTH CAROLINA:** 1,452 mph

**STRIKING TWICE:** On average, it takes about 375 years for a total solar eclipse to happen again at the same spot. However, Carbondale, Ill., will be in totality both for this eclipse and one on April 28, 2024.

**PAIRED ECLIPSES:** Solar and lunar eclipses always come in pairs, with one happening about two weeks before or after the other. A lunar eclipse was seen on Aug. 7 and 8 over much of Europe, Asia, Africa, Australia and Antarctica.

**TOTALITY TIME:** It can last from a few seconds to 7½ minutes. The maximum in this eclipse will be 2 minutes, 43 seconds.

## » EFFECTS

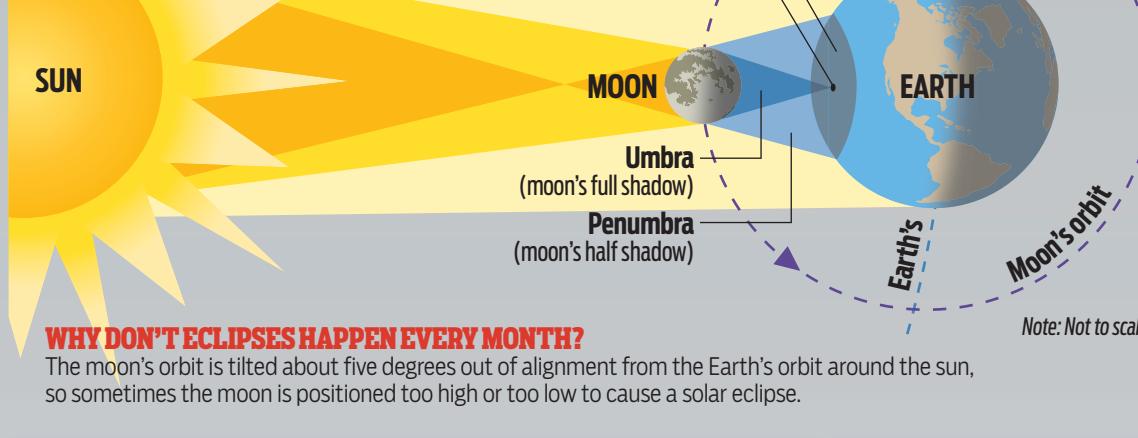
**SHADOW BANDS:** Moving wavy lines of alternating light and dark seen on the ground about 1 minute before totality.

**DIAMOND RING:** This effect — seen in the NASA image at the top of the page — occurs about 10 to 15 seconds before and after totality and is comprised of a single spot of light (the diamond) plus the sun's corona (the ring).

**BALLY'S BEADS:** Small blobs of light at the edge of the moon seen about 5 seconds before totality, formed by sunlight passing through uneven surfaces of the moon.

## » WHAT CAUSES SOLAR ECLIPSES?

A solar eclipse occurs when the moon comes between the sun and the earth and casts its shadow on the earth. The sun is 400 times wider than the moon, but since it is also 400 times farther away, they appear to us to be the same size. In a total eclipse, the moon fully blocks the sun. In a partial eclipse, only part of the sun is blocked. In an annular eclipse, the moon is directly in front of the sun, but a ring of sunlight remains; the moon appears too small to fully cover the sun because the moon's orbit is elliptical and sometimes it is farther from the earth.



### WHY DON'T ECLIPSES HAPPEN EVERY MONTH?

The moon's orbit is tilted about five degrees out of alignment from the Earth's orbit around the sun, so sometimes the moon is positioned too high or too low to cause a solar eclipse.

## » TWO HISTORIC TOTAL SOLAR ECLIPSES IN N.C.

Aug. 7, 1869

The eclipse entered the U.S. in Montana and crossed the Midwest, then went the length of North Carolina, extending from near what is now Elk Knob State Park in the northwest to near present-day Camp Lejeune.

*"Mr. Ellis closed his grandiloquent Singing School by a most grandiloquent Finale. Seven schools were to come, and two bands were to be here. But as it was such a grand failure, the sun kindly came to the rescue and gave us a magnificent eclipse of its splendor."*

— Extract from the Friedberg Diary with Macedonia, 1869 (courtesy of the Moravian Archives)

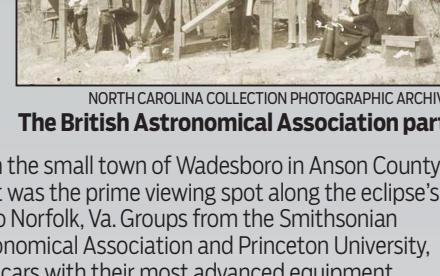
*"During the total obscuration the stars shone almost as bright as at night.... Business was almost suspended in the city."*

— New York Sun, Aug. 9, 1869, report from Wilmington

May 28, 1900



Image of the corona taken in Wadesboro



The British Astronomical Association party

Scientists converged on the small town of Wadesboro in Anson County, having determined that it was the prime viewing spot along the eclipse's path from New Orleans to Norfolk, Va. Groups from the Smithsonian Institute, the British Astronomical Association and Princeton University, among others, filled train cars with their most advanced equipment, including one telescope that was 135 feet long and had a 12-inch lens. The Smithsonian's photographer rigged cameras to telescopes and made eight plate glass negatives, which was considered a great achievement.

*"The day of the eclipse proved cloudless; the sky, while not of the deepest blue, was yet more than ordinarily clear, and the observing programme was carried through with general success."*

— Astrophysicist S.P. Langley, Smithsonian Institution

## DON'T USE TO VIEW THE SUN

SUNGLASSES (EVEN MULTIPLE PAIRS AT ONCE) • X-RAY FILM • COLOR FILM • SMOKED GLASS • FLOPPY DISKS • TELESCOPES, BINOCULARS OR CAMERAS WITHOUT SPECIAL SUN FILTERS

## » VIEWING THE ECLIPSE

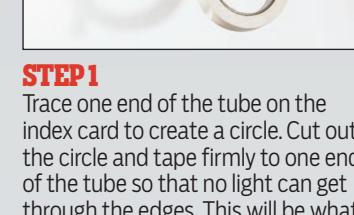
Never look directly into the sun, even for a few seconds, because its UV radiation can burn your retinas and permanently damage your eyes. The only exception is during the brief period, about one to two minutes depending on location, when the moon's shadow completely covers the sun — and only in locations along the path of totality. Otherwise, you will need special eclipse glasses (make sure they meet the ISO 12312-2 international standard) or a method to view a projection of the sun.

## HOW TO BUILD A PINHOLE PROJECTOR



**SUPPLIES**

- Long cardboard tube, such as for mailing or wrapping paper
- Square of aluminum foil larger than the tube's diameter
- Thick white cardboard
- Masking or duct tape
- Sturdy cutting blade
- Pin
- Pencil



### STEP 1

Trace one end of the tube on the index card to create a circle. Cut out the circle and tape firmly to one end of the tube so that no light can get through the edges. This will be what you view the eclipse against.



### STEP 2

Place aluminum foil over the other end of the tube, securing it firmly. You can tape it or put a rubber band around it to hold the foil in place if you need to. Punch a small hole in the middle of the foil with a pin. This will be your "projector."



### STEP 3

Cut a rectangular hole, about 3 inches by 2 inches, near the end without the foil. This will be the window through which you view the sun's projection onto the white end of the tube.



### STEP 4

Turn your back to the sun and place the tube over your shoulder with the viewing window down and the foil behind your back. The sun, pinhole and projection surface must all align in a straight line, which will create a circular shadow "sitting" on your shoulder. An image of the sun will be projected onto the white cardboard.