

# Eclipses

Eclipses have long been a source of mystery and spectacle. These events were viewed with fear and dread in the past. There is special vocabulary involved in describing eclipses but there is a way to keep from being confused. The eclipse is named for the object that is being eclipsed, or obscured. In a solar eclipse you observe the Sun (using only safe methods, of course). You will see the Sun with a piece apparently cut out of it. In a lunar eclipse you observe the Moon. A portion of its surface will be obscured.

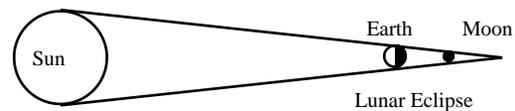
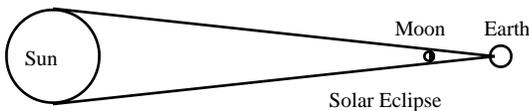
Another way to avoid confusion is to consider the time at which you will be viewing the eclipse. Because of the geometry described below, you can only view a solar eclipse when the Sun is up, and the Moon is nowhere to be seen. You view lunar eclipses when the Moon is up.

Eclipses occur when the Sun, Earth and Moon line up. They are rare because the Moon usually passes above or below the imaginary line connecting Earth and the Sun. In a solar eclipse the Moon passes directly in front of the Sun. This can only happen when the phase of the Moon is "new." That occurs because, for Earth-based observers, the far side of the Moon is illuminated while the side facing Earth is in darkness. The Moon, like any sphere, casts a shadow. A solar eclipse occurs when that shadow sweeps across Earth. The black cone is called the umbra, as in umbrella. An observer anywhere in that region is completely in shadow. None of the Sun is visible from there.

Surrounding the umbra is the penumbra. An observer there will see some, but not all, of the Sun. Outside of these regions, all of the Sun is visible. Note that the tip of the umbra barely touches Earth. At the current time the position of the Moon relative to the Sun is such that the Moon, which is 400 times smaller than the Sun, is 400 times closer! This means that the two objects appear to be the same size in the sky. Only observers at the tip of the umbral cone will see a total solar eclipse. A large number of observers across the globe will see a partial solar eclipse if they are in the penumbra.

An annular eclipse is a special partial solar eclipse. Because the Moon's orbit around Earth is an ellipse, not a circle, the Moon's distance from Earth varies. When the Moon is far from Earth it appears slightly smaller in the sky. (Earth's orbit around the Sun is also an ellipse, and during January, Earth is at its closest point to the Sun. The Sun's size is slightly larger than during the rest of the year.) With a "small" Moon and a "large" Sun the Moon will not completely block out the Sun. The umbra does not touch Earth. An observer would have to be above the surface of Earth to see a total eclipse. For individuals in just the right location, the Sun appears as a ring (annulus) around the silhouetted Moon.

In a lunar eclipse the Moon moves into Earth's shadow. They can only occur when the moon is "full." Observers on the night side of Earth see the Moon take on a reddish hue as it moves into Earth's umbra. If the entire disk of the Moon falls into the umbra it is a total lunar eclipse. If only a portion does, then it is a partial lunar eclipse. Penumbral lunar eclipses are very difficult to detect because the Moon dims only slightly while moving through that region. Lunar eclipses are more common than solar eclipses. Total eclipses of the Sun and Moon are partial before and after totality.



## More Information:

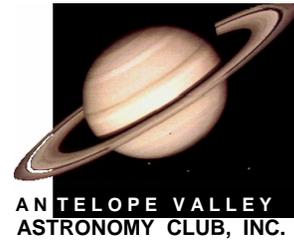
**Antelope Valley  
Astronomy Club, Inc.**

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Solar Eclipse As Seen From Earth

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*A 501 (c)(3) Non-Profit  
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ASTRONOMY CLUB, INC.

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# You Are Invited to Join the Antelope Valley Astronomy Club!



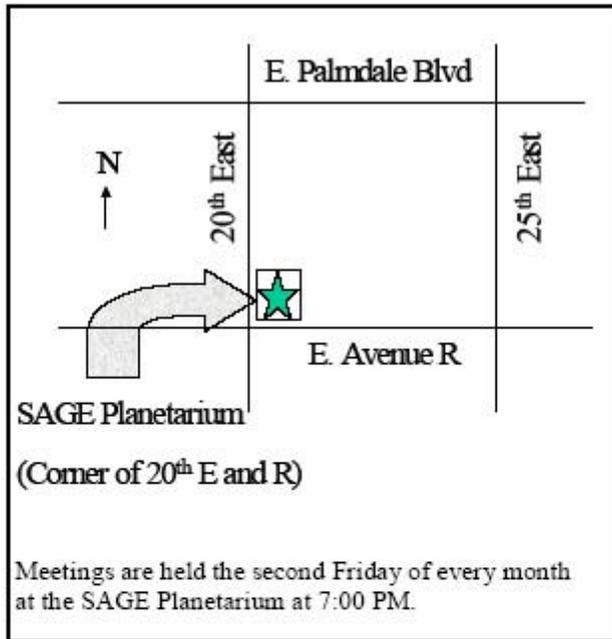
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ASTRONOMY CLUB, INC.

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## Monthly Meetings and Activities

The AVAC holds monthly meetings the second Friday of every month at the SAGE Planetarium, 38060 20th Street East, (located on the northeast corner of East Avenue R and 20th East) at 7:00 PM. The meetings include guest speakers and monthly programs about the fascinating night sky, while giving members and guests a chance to get together to talk about the stars or other topics of interest. We hold monthly public star parties and frequent 'deep sky' observing sessions as weather permits. We offer our members resources to help you learn more about astronomy including classes, telescopes and books.

## Directions to the Meeting



## AVAC Membership Application

AVAC Offers A Variety Of Membership Options:

- Family Membership Cost \_\_\_\_\_ (See Below)
- Individual Membership Cost \_\_\_\_\_ (See Below)
- Junior Membership (13 and younger) Total \_\_\_\_\_

Dues are prorated each month. See table below

*Example: A Family Membership paid in June is \$17.50*

### Membership Dues

Month	Family	Individual	Junior
JAN	\$ 30.00	\$ 25.00	\$ 15.00
FEB	\$ 27.50	\$ 22.92	\$ 13.75
MAR	\$ 25.00	\$ 20.83	\$ 12.50
APR	\$ 22.50	\$ 18.75	\$ 11.25
MAY	\$ 20.00	\$ 16.67	\$ 10.00
JUN	\$ 17.50	\$ 14.58	\$ 8.75
JUL	\$ 15.00	\$ 12.50	\$ 7.50
AUG	\$ 12.50	\$ 10.42	\$ 6.25
SEP	\$ 10.00	\$ 8.33	\$ 5.00
OCT	\$ 7.50	\$ 6.25	\$ 3.75
NOV	\$ 5.00	\$ 4.17	\$ 2.50
DEC	\$ 2.50	\$ 2.08	\$ 1.25

Checks should be made out to 'AVAC'  
You may mail them to the Club PO Box or bring checks or cash to the meeting. **Do not mail cash.**  
You may also pay via PayPal on our website.

Name(s)

Address

Phone

e-mail

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Galaxy M101, Viewed Through A 10" Telescope