

A partial eclipse of the Moon was visible from all of Australia on the evening of Wednesday, 1999 July 28. The eclipse began at 8:22 pm Eastern Australian Standard time, reached a peak at 9:34 pm, and ended at 10:46 pm. Because of the differences between time zones, the eclipse took place from 7:52 pm to 10:16 pm in South Australia and the Northern Territory, and from 6:22 pm to 8:46 pm in Western Australia.

A lunar eclipse occurs when the Moon, in its orbit around the Earth, passes into the Earth's shadow in space. This does not happen every month, because the Moon's orbit is tilted by just over 5 degrees with respect to the Earth's orbit around the Sun. Most of the time, therefore, the Moon passes 'above' or 'below' the shadow, resulting in no eclipse. During some lunar eclipses, the entire disc of the Moon passes into the Earth's shadow, resulting in a total lunar eclipse. However, during the July 28 event, only 40% of the Moon's diameter will be immersed in the shadow, resulting in a partial eclipse.

Times and dates mentioned in this guide refer only to passages through the Earth's dark, circular shadow called the umbra. Surrounding the umbra, there is a lighter region of shadow called the penumbra, through which the Moon also passes (sometimes, the Moon passes through only this region, missing the umbra altogether). However, except when the Moon's edge is very close to the umbra, it is very difficult to detect any penumbral effects, as this region includes some direct sunlight.

Watching the eclipse

Eclipses of the Moon, which are seen at night, are quite safe to watch. Indeed, binoculars can be used to give a better view than is seen with the unaided eye. Some confusion arises here because it is dangerous to look directly at the disc of the Sun at any time, including those times when part of the Sun's disc is hidden by the Moon during solar eclipses, which are seen during the day.

On the evening of July 28, as the centre of the Moon passed to the north of the Earth's shadow, it is the southern part of the Moon that appeared dark - the part to the upper right as seen from our part of the world. Although, during total eclipses, the shaded portion of the Moon typically appears red because more red light than blue passes through the Earth's atmosphere onto the Moon, this effect will not be obvious during July's eclipse, and the eclipsed portion of the Moon will simply appear quite dark.

While watching a lunar eclipse, it is interesting to reflect on the fact that, over two thousand years ago, the Greek astronomer Aristotle (384-322 BC) used them to support the argument that the Earth is round: the circular nature of the shadow of the Earth on the Moon is quite obvious! Also, lunar eclipses, like solar eclipses, have been associated with historical events. One of the more famous partial lunar eclipses was that of 1453 May 22, which so terrified the soldiers defending Constantinople that their loss of morale is said to have contributed to the city's defeat by the Turkish army!

Photographing the eclipse

It is possible to photograph the eclipse, but it is important to have a camera whose exposures can be set manually. Unfortunately, a camera giving automatic exposures will usually produce a very overexposed image of the Moon! It is also important to realise that the disc of the Moon appears very small as seen from Earth. If you use a 'normal' lens - which, on a modern camera, has a focal length of typically 35 to 50 millimetres - a disappointingly small image will appear on your film. You should, therefore, use a lens of much longer focal length than this - 200 millimetres or longer is recommended. As a guide to exposures, if you are using 100 ISO (100 ASA) film the typical exposure for the full Moon or partially eclipsed Moon is 1/125 second at f/8. If you are using a different speed film, you

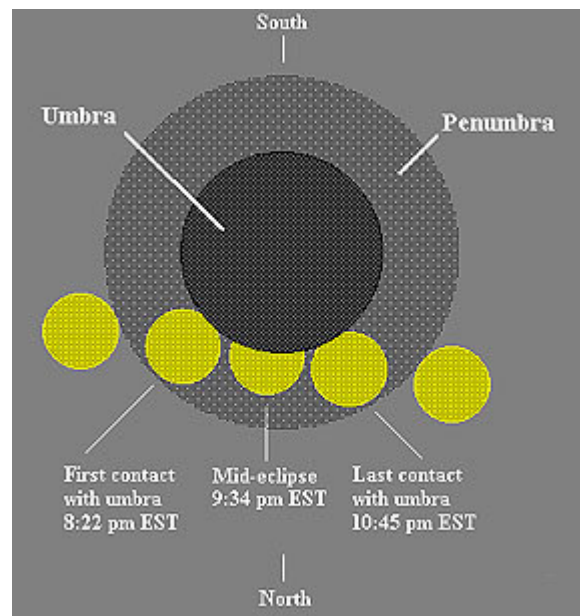
can adjust your exposure accordingly. For example, if you have 200 ISO film, you can halve the above exposure. It is a good idea to use a tripod, and to 'bracket' your exposures - try a range, centred on the recommended value. Also, if the Moon is seen through misty cloud, make sure that your exposure range extends up to several stops more than this figure (one 'stop' extra is equivalent to doubling the exposure). It is interesting to take a sequence of pictures of the eclipse - later on, you will have a fine record of the Moon passing through the shadow!

Recent and forthcoming eclipses

A recent lunar eclipse was visible from Australia on 1997 September 17, and was total. The next one visible from Australia was also total, and occurred on the night of 2000 July 16. That eclipse was the next eclipse of either type visible from Australia (the next solar eclipses seen from Australia was a partial eclipse on the morning of 2002 June 11, seen from the more northerly parts of mainland Australia; then, on the afternoon of December 4 in that year, a total solar eclipse, with totality being seen from Ceduna in South Australia and along a line to its north east).



This partial eclipse of the Moon occurred on 1990 August 6, and was visible from all of Australia. The sequence of photographs shows the progression of the Moon's disc through the northern part of the Earth's shadow. During this event, 68% of the Moon's diameter was immersed in the shadow at mid-eclipse. The photographs were taken by Karenne Barnes of the Astronomical Society of Tasmania Incorporated.



This diagram shows the passage of the Moon from west to east through the Earth's shadow on July 28. The Moon's immersion in the shadow reached a peak at 9:34 pm EST. The passage through the penumbra was barely noticeable. The diagram is oriented so that north is to the bottom; this roughly corresponds to 'lower left' as the eclipse is observed from Australia.

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Predictions of crater timings of the July 28 lunar eclipse can be found at the [Lunar Eclipse Observer Page](#) maintained by Byron Soulsby at the Calwell Lunar Observatory, plus a proposed "live" web cast of this event.