



## Eclipse of the Sun 24 November 2003

**Warning:** It is very dangerous to look directly at the Sun, especially through binoculars or telescopes. **SERIOUS EYE DAMAGE MAY RESULT.** A safe method of indirectly observing the Sun’s disc is described below.

### General Information

On the morning of Monday 24 November 2003 there will be a total eclipse of the Sun visible from parts of Antarctica. This will be visible as a **partial** eclipse throughout Australia except for the northern part of Cape York. The partial eclipse will also be visible from the South Island of New Zealand.

The partial phases will be visible from beginning to end except for most of Western Australia where the Sun will already be partially eclipsed at sunrise.

There are a number of flights arranged to Antarctica to view totality from the air, but these are expensive and are likely to be already booked out. Contact your travel agent for details.

The last solar eclipse visible from Australia was the South Australian total eclipse on 4 December 2002 that was seen as partial throughout the rest of Australia.

The next eclipse to be visible from Australia will be on 7 February 2008. It will be seen as a partial eclipse and only from south-east Australia.

### Table of eclipse times

Following are the circumstances in LOCAL TIME for Australian capital cities. Summer time has been added where applicable (ACT, New South Wales, Victoria, South Australia and Tasmania).

City	Eclipse begins	Maximum eclipse	Fraction of Sun’s diameter covered	Eclipse ends
Adelaide	7.25 am	8.11 am	44%	9.00 am
Brisbane	7:04 am	7:32 am	11%	8:01 am
Canberra	8:01 am	8:44 am	31%	9:30 am
Darwin	6:23 am	6:42 am	7%	7:01 am
Hobart	8:08 am	8:58 am	46%	9:51 am
Melbourne	8:01 am	8:47 am	41%	9:37 am
Perth	Sunrise (5.05 am)	5:40 am	61%	6:28 am
Sydney	8:02 am	8:42 am	26%	9:25 am

### How solar eclipses occur

A solar eclipse occurs when the moon, in its circuit around the Earth, blocks all or part of the Sun's disc as seen from the surface of the Earth (see figure 1). Only by observing from within the cone-shaped **umbra** of the moon's shadow can we see the Sun's disc completely obscured; from within the lighter **penumbra** at least part of the Sun remains visible and we witness only a partial eclipse.

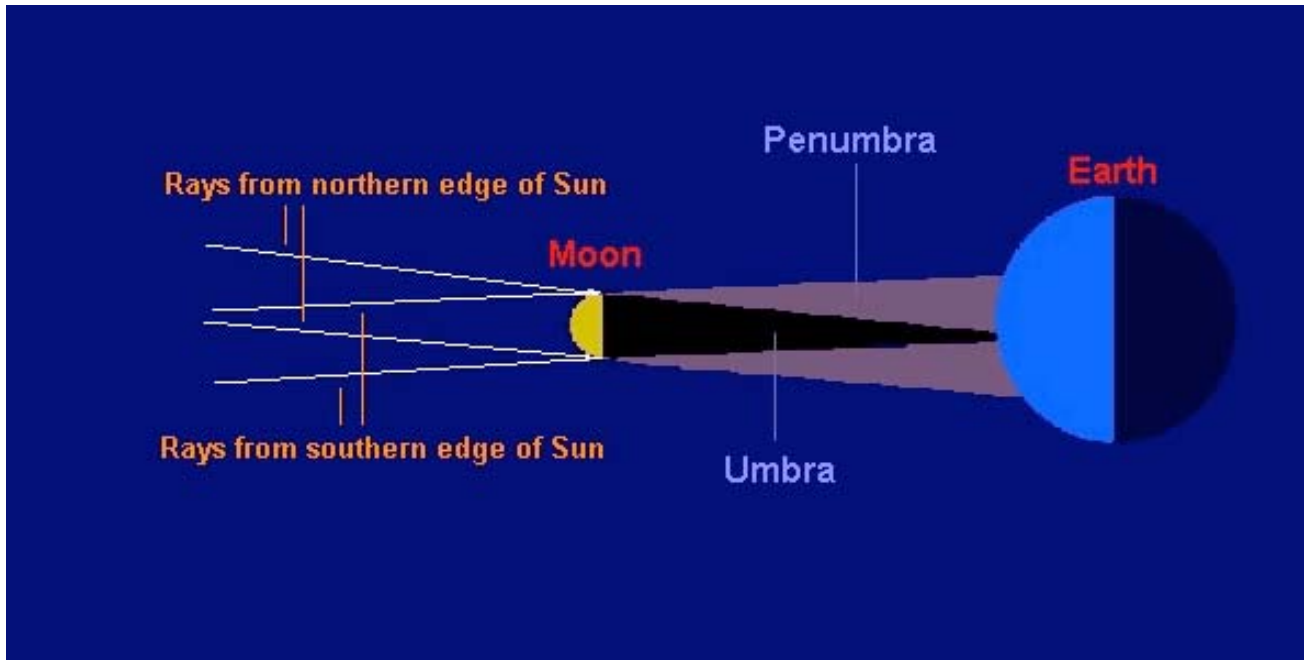
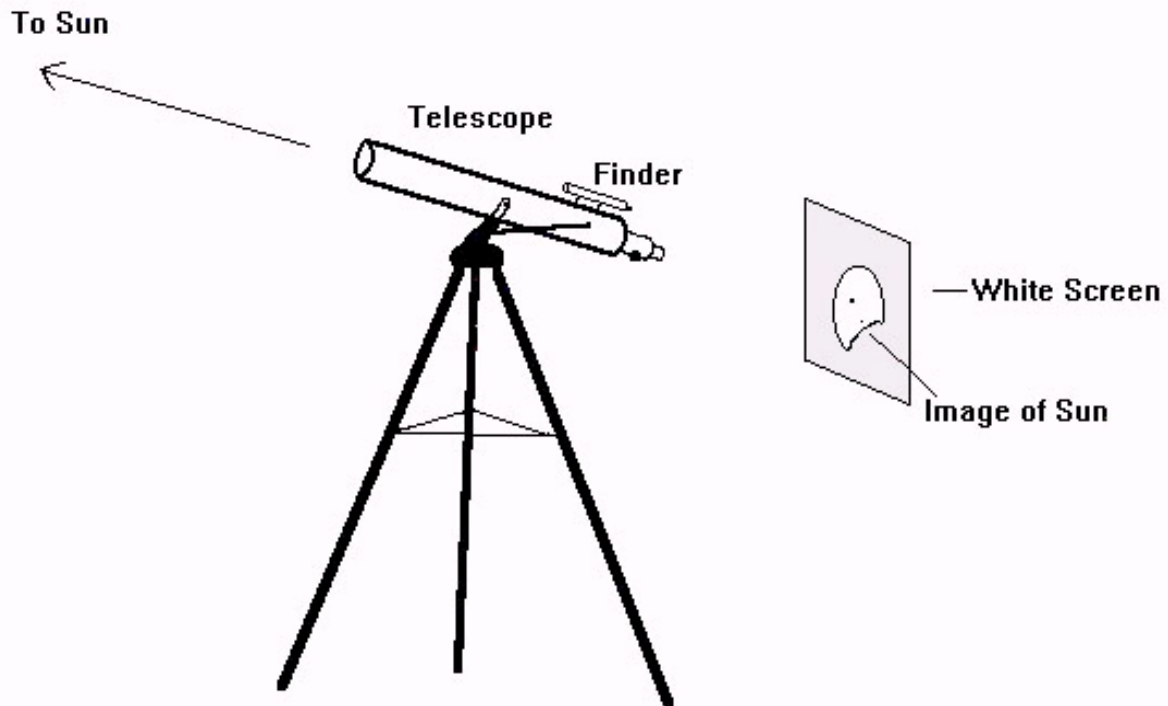


Figure 1 – How a solar eclipse occurs

Although a solar eclipse of some kind occurs somewhere on Earth at least twice each year in only some of these events does the moon completely cover the Sun; sometimes the umbra misses the Earth altogether, passing 'above' or 'below' our planet. Even when the umbra does intersect the Earth, we are very close to its end where the width of the shadow is very small. So as the moon's shadow moves from west to east across the Earth's surface due to the orbital motion of the moon, it traces out a quite narrow path – at most about 270 km wide. Only those people lucky enough to be within the path of totality will see the brief spectacle of the moon completely covering the Sun while people on a large surrounding area of the Earth's surface will witness a partial eclipse. Sometimes the Earth's surface is actually beyond the cone of the umbra and we see an **annular** eclipse. In these eclipses a ring of sunlight appears to surround the moon at mid-eclipse and the Sun is not completely covered from any location. Such an annular eclipse was seen from Australia in February 1999.

### How to watch the eclipse safely

The best way is to contact your local observatory or local amateur astronomical society. However, it is possible to safely watch the eclipse yourself using a small telescope to project the image, as shown in figure 2. With your back to the Sun aim a telescope towards it (this is not as difficult as it sounds – use the shadow of the telescope) and focus its image onto a white card held about 20 cm behind the eyepiece. **DO NOT LOOK THROUGH THE TELESCOPE OR ITS LITTLE FINDERSCOPE!** Never leave the telescope unattended and ensure that children are supervised at all times. Viewing the projected image is quite safe, but looking through the telescope will cause almost instant blindness.



**How to use a telescope to project an image of the Sun.  
NEVER look through the telescope or its finder!**

Figure 2

If you do not have access to a telescope you can also use a large piece of card with a hole or holes of about 2 mm across. With your back to the Sun, hold the card so that the sunlight passes through the hole and onto another card held about a metre away. This 'pinhole method' will give you an image of the Sun that is small, but good enough to make out the missing 'bite' on the disc. You may also notice during the eclipse that there are images of the eclipsed Sun under leafy trees where the gaps between the leaves form little 'pinholes' of their own!

### More information

<http://sunearth.gsfc.nasa.gov/eclipse/TSE2003/TSE2003.html>

*This information was prepared for the ASA by Nick Lomb of Sydney Observatory (<http://www.sydneyobservatory.com.au>) and Martin George of Launceston Planetarium (<http://www.qvmag.tased.edu.au/planetarium.html>). This sheet may be freely copied for wide distribution provided the Australian Astronomy and ASA logos are retained.*

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