

What are Eclipses ?

An Eclipse is an astronomical event that occurs when an astronomical object is temporarily obscured, either by passing into the shadow of another body or by having another body pass between it and the viewer. This alignment of three celestial objects is known as a Eclipse.

An eclipse is when one celestial object moves in front of the other. There are two types of Eclipses: **Solar Eclipse & Lunar Eclipse**

SOLAR ECLIPSE



LUNAR ECLIPSE



SIMILARITY BETWEEN SOLAR & LUNAR ECLIPSE

Only Similarity between the two types of Eclipses:

Both involve the Earth, the Moon and the Sun. The positioning of all of these three bodies determines the eclipse type.

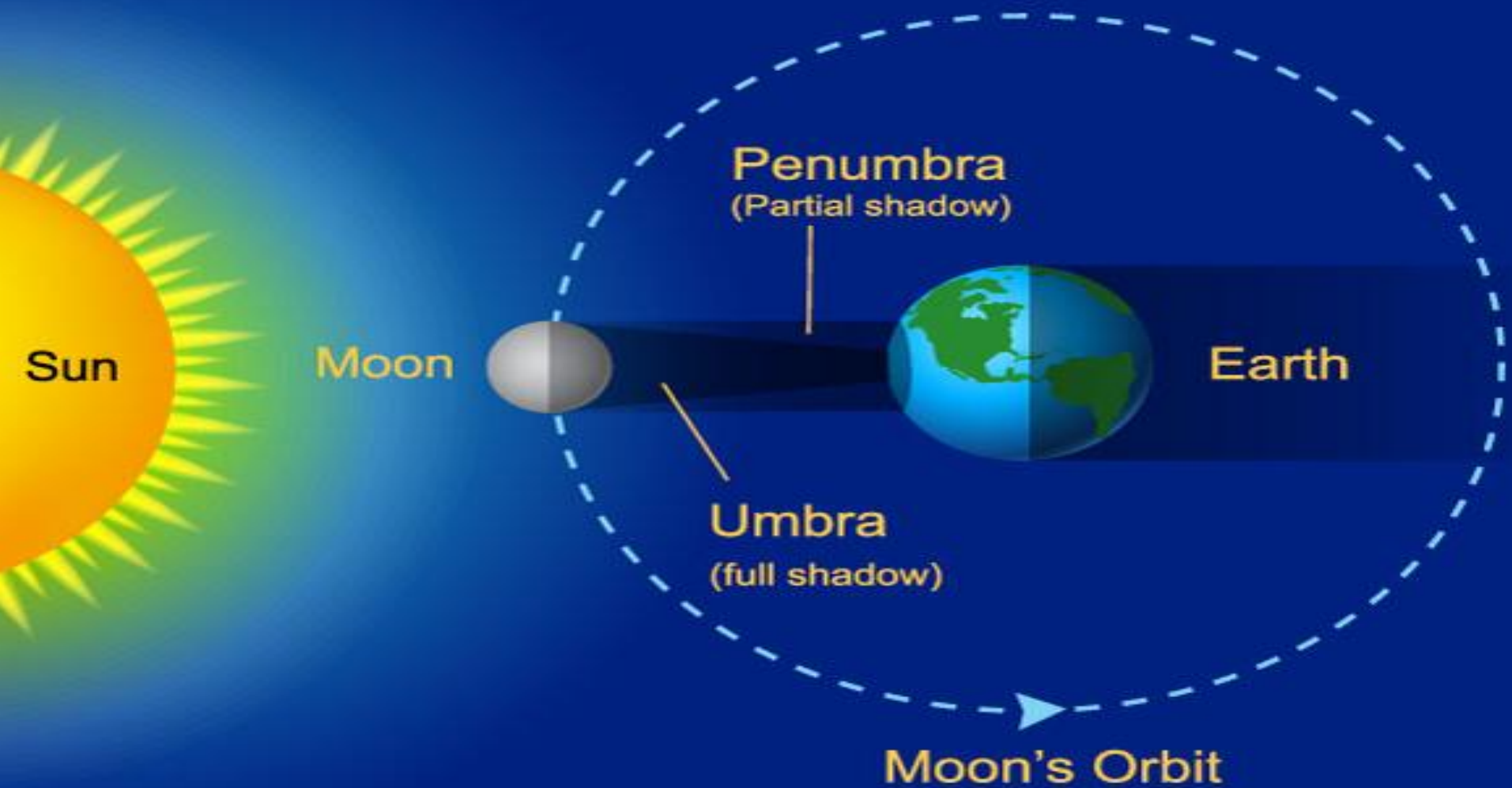
SOLAR ECLIPSE

A Solar Eclipse occurs when the Moon passes in front of the Sun, blocking it out partially or completely.

The Eclipse results in parts of the Earth being covered in the shadow of the Moon. During a solar eclipse, the Moon actually casts two shadows towards Earth.

One shadow is called the umbra which becomes smaller as it reaches the Earth. The second shadow is called the penumbra which becomes larger as it reaches the Earth

Anatomy of a Solar Eclipse



Why does the Solar Eclipse occur?

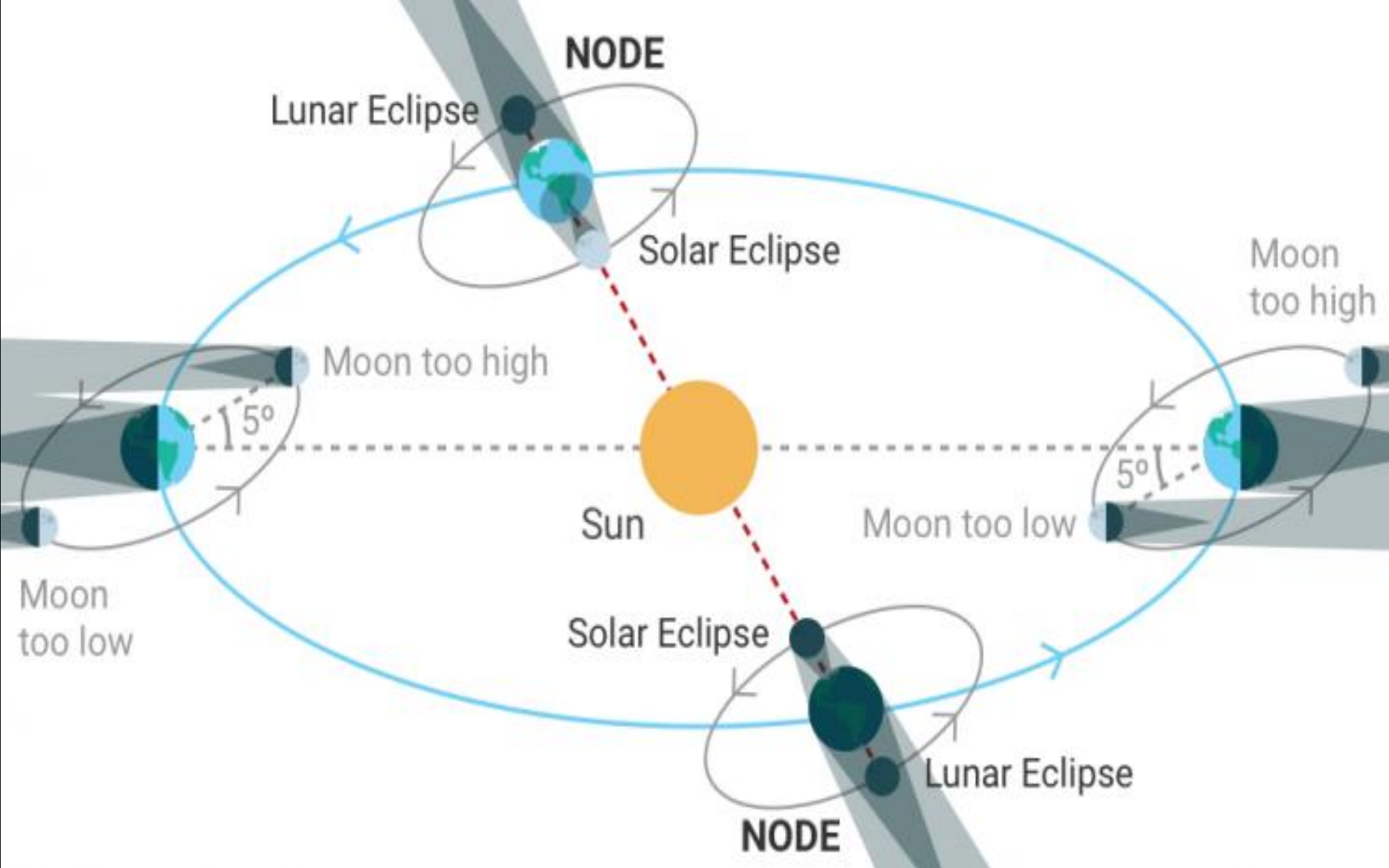
An eclipse of the Sun (or solar eclipse) can *only occur at New Moon* when the Moon passes between Earth and Sun.

If the Moon's shadow happens to fall upon Earth's surface at that time, we see some portion of the *Sun's disk covered or 'eclipsed' by the Moon.*

Why Solar Eclipse doesn't happen every New Moon day ?

Since New Moon occurs every month, one might expect a solar eclipse at least once a month. Unfortunately, this doesn't happen because the Moon's orbit around Earth is tilted 5 degrees to Earth's orbit around the Sun.

As a result, the Moon's shadow usually misses Earth as it passes above or below our planet at New Moon. At least twice a year, the geometry lines up just right so that some part of the Moon's shadow falls on Earth's surface and an eclipse of the Sun is seen from that region.



Types of Solar Eclipse: **Partial Eclipse**



Types of Solar Eclipse : Annular Eclipse



Types of Solar Eclipse : **Total Solar Eclipse**



Types of Solar Eclipse : **Hybrid Solar Eclipse**



Partial Solar Eclipse

Observed from **Earth when it is in the Moon's outer shadow or 'Penumbra'**. The ever-so-slight darkening caused by the 'Penumbral Shadow' is hardly noticeable.

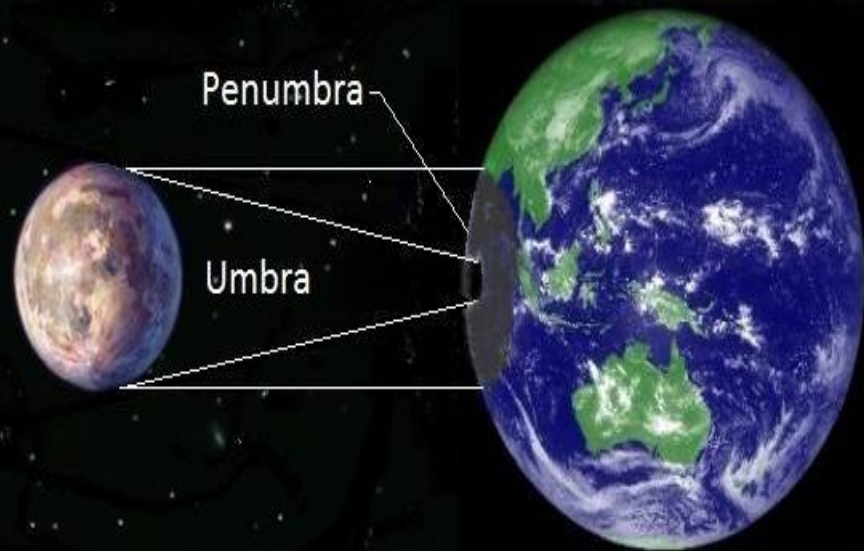
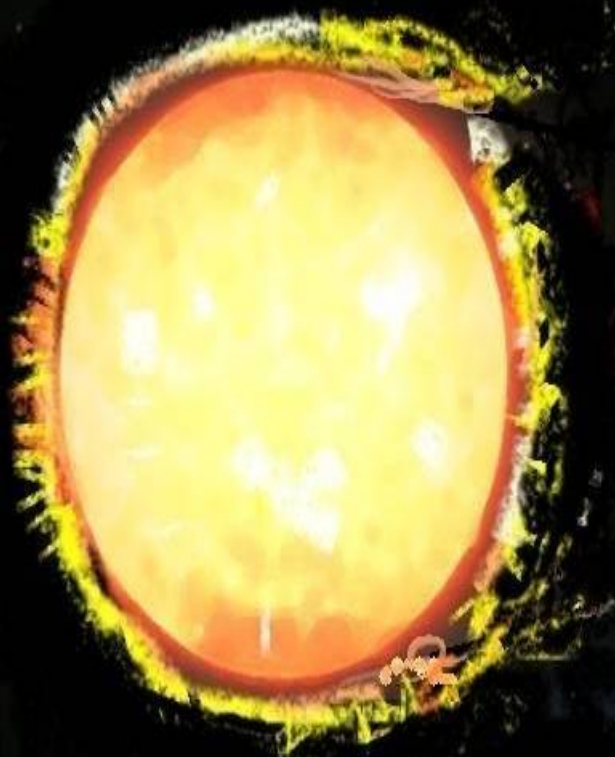
The Sun's light is so brilliant that even when partially obscured, it is **difficult to notice a darkening in surrounding light** (despite the obvious 'bite' of the Sun in the sky). Even when 60% obscured, things can seem normal.

It is witnessed during the build up to a total solar eclipse, annular solar eclipse or just during an eclipse that will only ever be partial. **Often seen from a large area of Earth**, these types of Solar Eclipses are seen more often than any.

Total Solar Eclipse

A Total Solar Eclipse is the **rarest of the three Solar Eclipse types** mentioned. In order for this event to happen, the Moon must be at new phase and not be near apogee in its orbit around the Earth.





Area of dark umbra shadow is region of Total Solar Eclipse - Totality
Lighter shaded area is region of Partial Solar Eclipse

Annular Solar Eclipse

An Annular Solar Eclipse is much more rare than a partial solar eclipse. There are times when the new moon is located farther away from Earth than at other times.

When moon is at farthest approach means smallest angular size than Sun. Moon does not exactly cover the Sun.

Deciding Factor between ASE & TSE

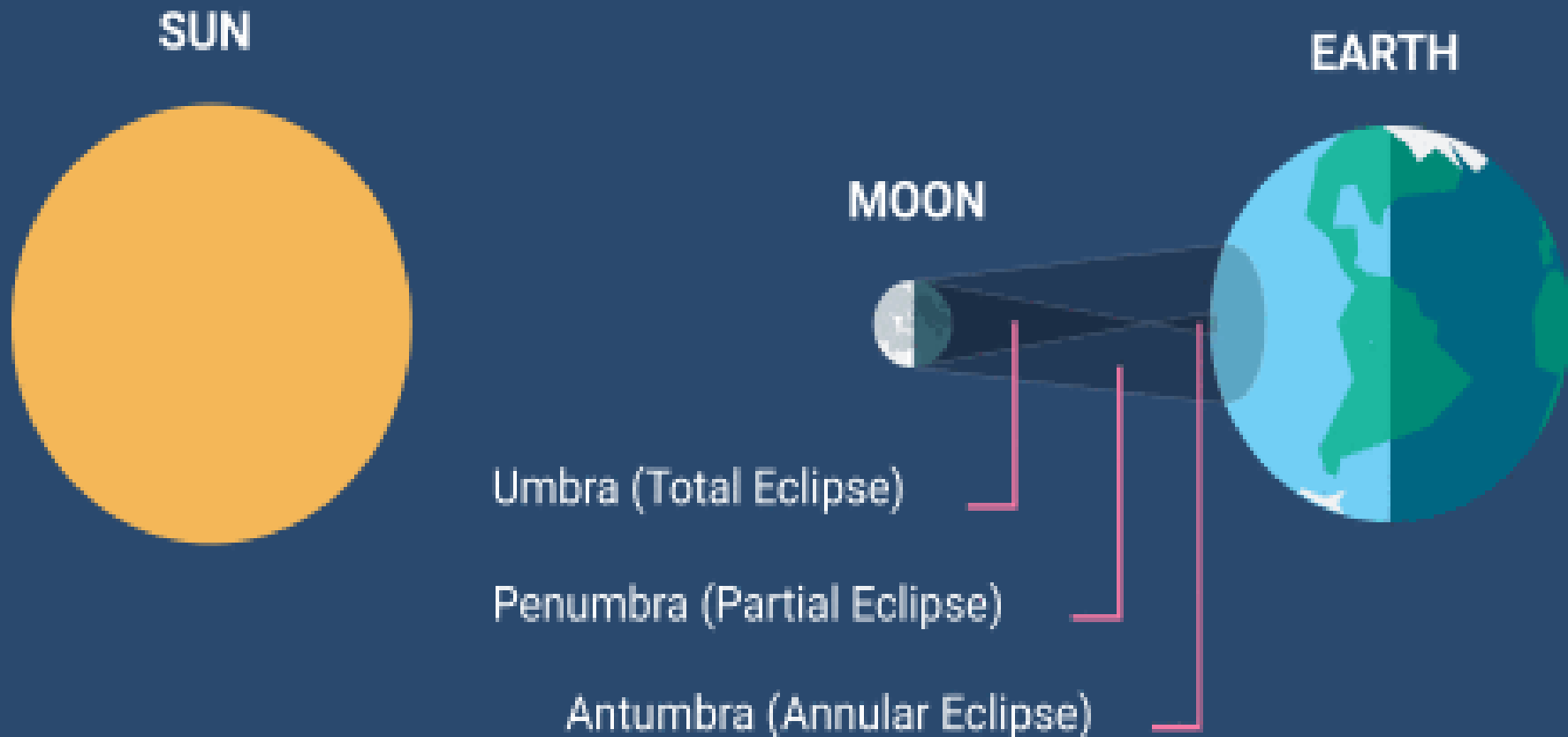
It is the position of the Moon in its orbit that decides the type of Solar Eclipse viewed on the Earth.

Due to elliptical orbit of the Moon around the Earth, there are two different positions of Moon around the Earth. **Also the angular size of the Moon & Sun seen from the Earth is different at these positions.**

The point at when it is farthest away is called 'apogee'. If a full eclipse of the sun happens around this time, an annular solar eclipse is witnessed due to the Moon appearing slightly smaller than the Sun

One of the most amazing is that moon and the Sun appear to be almost exactly the same size in the sky and they're both the size of your fingernail held at arm's length. However we see the angular size of Moon & Sun from Earth.

Geometries deciding for type of Solar eclipse



How often do Solar Eclipses happen?

It's commonplace to hear that Solar Eclipses are rare. However, on average there are **2.4 Solar Eclipses every year** visible from somewhere on the Earth. This number includes total, annular and partial solar eclipses.

A total solar eclipse is visible from somewhere on Earth approximately every 18 months. It is rare to witness a total solar eclipse as the total phase of the eclipse is only visible from a narrow corridor across the Earth's surface.