Solar eclipses occur when the Moon gets between the Sun and the Earth.
No eclipse
Eclipse!
Solar eclipses occur when the Moon gets between the Sun and the Earth. Although the moon orbits the earth ~once per month, an alignment like this only occurs about twice a year.
Every total eclipse on the planet in 50 years (2010-2060)

Each total eclipse is seen by one thousandth of the Earths' surface. Most of the planet does not see a total eclipse in 50 years.
What do you experience during a solar eclipse?
Before and after a total eclipse we see a partial eclipse, as the moon moves between us and the Sun and then out of alignment again.
What do you experience during the partial phase?
ECLIPSE
MAY 20, 2012
Life and the eclipse
What do you experience during a solar eclipse?
What do you experience during a solar eclipse?
Total Solar Eclipse as seen from Madras, OR, August 21<sup>st</sup> 2017.

CREDIT: Rick Fienberg
(former AAS Press Officer)
Annular eclipses
At perigee, the Moon is closer to the Earth and looks slightly larger.

Moon’s Orbit is elliptical (greatly exaggerated here).

At apogee, the Moon is farther from the Earth and looks slightly smaller.

Perigee: 362,570 km
Apogee: 405,410 km
Annular Solar Eclipses

When Earth is near perihelion, and the moon is near apogee, we see an annular solar eclipse.

The angular sizes of the moon and the sun vary, depending on their distance from Earth.
How long do eclipses last?

1

2
### Solar Eclipse Details

- **Latitude**: 29° 36' 46.77" N
- **Longitude**: 98° 39' 15.81" W
- **Date**: 2023/10/14
- **Time (UT)**: 15:23:29.4
- **Altitude**: +33.1°
- **Azimuth**: 124.5°
- **P**: 313°
- **V**: 12.0
- **LC**: Start of partial eclipse (C1)

**Eclipse Phases**:
- **Start of partial eclipse (C1)**: 2023/10/14 15:23:29.4
- **Start of annular eclipse (C2)**: 2023/10/14 16:51:37.9
- **Maximum eclipse (MAX)**: 2023/10/14 16:53:46.4
- **End of annular eclipse (C3)**: 2023/10/14 16:55:54.8
- **End of partial eclipse (C4)**: 2023/10/14 18:32:20.2

### Path and Obscuration
- **Path Width**: 191.8km (119.2mi)
- **Obstruction**: 90.006%
- **Antumbral Depth**: 48.24% (46.3km)
- **Annular Depth**: 49.6km (30.8mi)
- **Mean Anomaly**: 29.61299°
- **Lunisolar Time**: 3m 59.3s (lunar limb corrected)
- **Observation Area**: San Antonio, TX

### Map Details
- **Moon/Sun Size Ratio**: 0.96199
- **Anomalous Vel.**: 0.843km/s (1886 mph)

### Additional Information
<table>
<thead>
<tr>
<th>Event (ΔT=71.2s)</th>
<th>Date</th>
<th>Time (UT)</th>
<th>Alt</th>
<th>Azi</th>
<th>P</th>
<th>V</th>
<th>I/C</th>
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</thead>
<tbody>
<tr>
<td>Start of partial eclipse (C1)</td>
<td>2024/04/08</td>
<td>17:14:35.5</td>
<td>+60.8°</td>
<td>134.9°</td>
<td>227°</td>
<td>03.0</td>
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<tr>
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<td>2024/04/08</td>
<td>18:32:59.5</td>
<td>+68.0°</td>
<td>177.8°</td>
<td>099°</td>
<td>08.7</td>
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<tr>
<td>Maximum eclipse (MAX)</td>
<td>2024/04/08</td>
<td>18:34:21.2</td>
<td>+68.0°</td>
<td>178.7°</td>
<td>316°</td>
<td>01.4</td>
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</tr>
<tr>
<td>End of total eclipse (C3)</td>
<td>2024/04/08</td>
<td>18:35:42.9</td>
<td>+68.0°</td>
<td>179.6°</td>
<td>174°</td>
<td>06.2</td>
<td>+0.0s</td>
</tr>
<tr>
<td>End of partial eclipse (C4)</td>
<td>2024/04/08</td>
<td>19:55:42.5</td>
<td>+61.2°</td>
<td>224.3°</td>
<td>045°</td>
<td>11.7</td>
<td></td>
</tr>
</tbody>
</table>

Umbra depth: 20.96% (20.2km)
Path width: 193.0km (119.9mi)
Obscuration: 100.00%

Magnitude at maximum: 1.00590
Moon/Sun size ratio: 1.05628
Umbral vel.: 0.723km/s (1610 mph)
Silly me, Hank! I got it backwards... It's cardboard for a SOLAR ECLIPSE and Binoculars for a LUNAR ECLIPSE!
Pre-eclipse at the Tetons

Post-eclipse in Wyoming
AAS
AMERICAN
ASTRONOMICAL
SOCIETY

https://eclipse.aas.org/