



1
00:00:01,568 --> 00:00:05,005
A solar eclipse occurs when the moon moves between the Earth and

2
00:00:05,005 --> 00:00:09,826
the sun, blocks the sun's light, and casts a shadow on the Earth.

3
00:00:09,826 --> 00:00:12,646
When the moon completely covers the bright disk of the sun,

4
00:00:12,646 --> 00:00:16,200
that's a total solar eclipse, and it happens roughly every

5
00:00:16,200 --> 00:00:20,187
year and a half somewhere on Earth. A partial solar eclipse

6
00:00:20,187 --> 00:00:25,259
is more common, happening at least twice a year. A lunar

7
00:00:25,259 --> 00:00:28,045
eclipse, on the other hand, is where the moon moves behind the

8
00:00:28,045 --> 00:00:31,515
Earth, so it's now the Earth blocking the sun's light on the

9
00:00:31,515 --> 00:00:36,136
moon, creating a shadow on it with a red tint. The easy way to

10
00:00:36,136 --> 00:00:39,573
remember the difference is to remember what gets darker. With

11

00:00:39,573 --> 00:00:43,694

a solar eclipse, the sun gets darker, and during a lunar

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00:00:43,694 --> 00:00:47,414

eclipse, the moon does. A solar eclipse is a rare event that not

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00:00:47,414 --> 00:00:50,050

many get to see, because the moon's shadow is relatively

14

00:00:50,050 --> 00:00:54,054

small. This limits the locations on Earth that get to see it. You

15

00:00:54,054 --> 00:00:58,408

have to be on the sunny side of the planet, and you have to be

16

00:00:58,408 --> 00:01:01,061

in the path of the moon's shadow. So, if you find your

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00:01:01,061 --> 00:01:05,098

area in the path of totality one year, you've hit the jackpot,

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00:01:05,098 --> 00:01:08,068

because on average, that same spot on Earth will only get to

19

00:01:08,068 --> 00:01:12,072

see a solar eclipse every three hundred seventy-five years!

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00:01:12,072 --> 00:01:16,944

During a solar eclipse, the moon casts a shadow with two parts:

21

00:01:16,944 --> 00:01:20,580
the umbra and penumbra. The moon's umbra is the part of the moon's

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00:01:20,580 --> 00:01:24,551
shadow where the entire sun is blocked by the moon. In space,

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00:01:24,551 --> 00:01:27,571
it's a cone extending some four hundred thousand kilometers

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00:01:27,571 --> 00:01:31,525
behind the moon. It's when the small end of this cone hits the

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00:01:31,525 --> 00:01:36,663
Earth that we experience a total solar eclipse. Most eclipse maps

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00:01:36,663 --> 00:01:39,549
depicting the path will show you a circle representing the

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00:01:39,549 --> 00:01:43,020
shadow of the moon, but in actuality, the true shape of the

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00:01:43,020 --> 00:01:46,273
umbra is more like an irregular polygon with slightly curved

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00:01:46,273 --> 00:01:50,661
edges. This is because the moon isn't a perfect circle – it has

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00:01:50,661 --> 00:01:54,047
mountains and valleys on its surface, which all affect the

31
00:01:54,047 --> 00:01:57,184
passing sunlight and subsequent
shape of its shadow. And

32
00:01:57,184 --> 00:02:00,354
scientists now have a greater
understanding of the shape of

33
00:02:00,354 --> 00:02:02,456
the moon's surface, thanks to
NASA's Lunar Reconnaissance

34
00:02:02,456 --> 00:02:06,126
Orbiter. The unprecedented level
of detail from the topographic

35
00:02:06,126 --> 00:02:10,130
maps, photos, and other datasets
has allowed us to more precisely

36
00:02:10,130 --> 00:02:13,784
pinpoint the regions on Earth
falling within the path of

37
00:02:13,784 --> 00:02:18,522
totality of a solar eclipse. So
if you get the chance to witness

38
00:02:18,522 --> 00:02:22,326
a solar eclipse, always remember
that our little moon plays a