# What is a solar eclipse?

KS2 KS3 Ages 7-14 ⏰ 3 min read

A solar eclipse happens when the Moon passes directly between Earth and the Sun, blocking the Sun's light and casting a shadow on Earth. The result — from within that shadow — is the Sun going dark in the middle of the day. At totality, the sky darkens to near-night, stars appear, the air temperature drops, and the Sun's outer atmosphere (the corona) becomes visible as a ghostly white halo around the black disc of the Moon.

## Why is the fit so perfect?

By a remarkable cosmic coincidence, the Moon is almost exactly the right size and distance to cover the Sun's disc precisely. The Sun is about 400 times the diameter of the Moon, but also about 400 times further away. This means from Earth, they appear almost exactly the same apparent size. As a result, the Moon can cover the Sun exactly — just barely hiding it, with the corona visible around the edges. No other planet in the Solar System has a moon that produces this kind of perfect alignment. We got lucky.

Hold a 50p coin at arm's length and it covers roughly the same area as the Moon in the sky. Now a friend holds a beach ball the same apparent size from a much greater distance. The beach ball is enormously larger than the coin, but from your viewpoint, they look the same. That's the Sun and Moon. One is a small rock relatively nearby; the other is a star 1.4 million kilometres across. They just happen to look the same size from here.

## Why don't eclipses happen every month?

The Moon orbits Earth roughly every 29.5 days, so you might expect a solar eclipse every new moon. But the Moon's orbital plane is tilted about 5° relative to Earth's orbital plane around the Sun. Most months, the Moon passes slightly above or below the Sun's position in the sky — no eclipse. A total solar eclipse requires precise alignment, which happens in any given location only once every few hundred years on average.

## Where can you see one?

The path of totality — where the Moon's full shadow falls — is only about 160km wide and races across Earth's surface. Outside this path, you might see a partial eclipse (some of the Sun covered), but not totality. Totality is the experience: partial eclipse is interesting; totality is profoundly disorienting and, for many people who witness it, one of the most extraordinary experiences of their lives.