

What Are Eclipses?

Eclipses are all about shadows. Eclipses occur when one astronomical object moves in front of another, or when an astronomical object moves into the shadow of another object. In the sun-Earth-moon system, eclipses occur when the sun, Earth and moon all line up. In astronomical terms, this is called <u>syzygy</u>, a word derived from Ancient Greek that means "yoked together."

Solar Eclipses:

Eclipses of the sun occur when the new moon passes between the Earth and sun. When the moon covers the entire disk of the sun, we see a spectacular total eclipse of the sun with the corona glowing.



During the eclipse, the moon's shadow is cast on the Earth's surface. You can see in this diagram that some of the Earth will be in "full shadow," while some of it is in "partial shadow." Depending on where you are on the Earth, you'll see a full, or <u>total eclipse</u>, or a <u>partial eclipse</u>. There's also a third type of eclipse: <u>annular eclipses</u>. We'll talk more about them later!





Total Eclipses:

Seeing a total eclipse is a really awesome experience! First, you have to be careful to protect your eyes. Never look at the sun without proper glasses- you could injure or damage your eyesight!

Next, you have to be at the right place at the right time. Sometimes this is called the "path of totality," or the parts of the Earth that the moon's shadow will travel over. NASA puts out maps, like the one here, for eclipses that move across the US.



If you were in space during an eclipse, you would see the moon's shadow rushing across the surface of the Earth at thousands of miles/hour! If you stand still in the path of totality it will take a couple of hours for the entire eclipse to happen, with only about 7 of those minutes being during the total eclipse.

During an eclipse, you'll notice the sky start to get darker, like it does in the evening. If you use your eclipse glasses, you will start to see a "bite" taken out of the sun that will grow larger and larger. When the sun is completely blocked it will be pretty dark outside, like it is after the sun goes down. You might hear night-time bugs and frogs start to come out!

Partial Solar Eclipses:

If you aren't in the "path of totality" you'll see a partial solar eclipse. The sun will have a "bite" taken out of it. You can use NASA's website (linked on the next page) to see how much of the sun will be covered in your area. Remember, you still need to wear protective glasses during a partial eclipse!





Annular Eclipses:

Annular Eclipses are a very cool thing to see! But what are they? First, we have to think about how the Earth and the Moon move. The Moon orbits around the Earth, roughly in a circle. But this circle isn't perfect- the Moon actually moves in an oval shape.



When the Moon is closer to the Earth, we say it is at <u>perigee</u>; when the Moon is furthest from the Earth, it is at <u>apogee</u>. You can see this in the image from NASA. If there's an eclipse when the Moon is at apogee, the Sun will appear larger than the Moon! This means that parts of the Sun will stick out from around the sides of the Moon, even in the path of totality, so the sky won't get fully dark. This creates a neat affect called the "ring of fire"- you can see it on the photo on the first page.

More Resources:

NASA always does a great job creating resources before any major eclipses that can be seen from the US. <u>You can find out</u> more on their page here (or scan the QR code).

GSGATL will be putting out a fun patch kit leading up to both the October 16, 2023 and April 8, 2024 eclipses. You can use these activities to help earn your Space Science badge as well! Watch our <u>events calendar</u> for fun activities at our Girl Scout Camps too.



