I'm not a bot



Below, check out a visualization of the April 8, 2024, total solar eclipse! What's the difference between a lunar eclipse? Solar Eclipse A solar eclipse? Solar Eclipse? Solar Eclipse A solar eclipse? Solar Eclipse? it gets dark in the middle of the day? This total eclipse happens about every year and a half somewhere on Earth. A partial eclipse, when the Moon doesn't completely cover the Sun, happens at least twice a year somewhere on Earth. United States on Aug. 21, 2017. This image was captured in Hopkinsville, Kentucky during the 2017 eclipse. Credit: NASA/MSFC/Joseph Matus But not everyone experiences every solar eclipse. Credit: NASA/MSFC/Joseph Matus But not everyone experiences every solar eclipse. to be on the sunny side of the planet when it happens. You also have to be in the path of the Moon's shadow. On average, the same spot on Earth only gets to see a solar eclipse for a few minutes about every 375 years! Caution! Eye Safety During a Total Solar Eclipse for a few minutes about every 375 years! completely blocks the Sun's bright face, it is not safe to look directly at the Sun without specialized eye protection for solar viewing. For safety information, visit the NASA Eclipse Safety Page. Lunar Eclipse Buring a lunar eclipse, Earth gets in the way of the Sun's light hitting the Moon. That means that during the night, a full moon fades away as Earth's shadow covers it up. The Moon can also look reddish because Earth's atmosphere and absorbing other colors is also why sunsets are orange and red. During a total lunar eclipse, the Moon is shining from all the sunrises and sunsets occurring on Earth! Note: This diagram is not to scale. Credit: NASA/JPL-Caltech The Moon appeared a reddish color during a total lunar eclipse every month? You might be wondering why we don't have a lunar eclipse every month as the Moon orbits Earth. It's true that the Moon goes around Earth every month, but it doesn't always get in Earth's shadow. The Moon's path around Earth is tilted compared to Earth's orbit around Earth but still get hit by light from the Sun. In this diagram, you can see that the Moon's orbit around Earth but still get hit by light from the Sun. In this diagram, you can see that the Moon's orbit around Earth is at a tilt. This is why we don't get a lunar eclipse every month. This diagram is not to scale: the Moon is much farther away from Earth than shown here. Credit: NASA/JPL-Caltech Because they don't happen every month, a lunar eclipse is a special event. Unlike solar eclipses, lots of people get to see each lunar eclipse. If you live on the nighttime half of Earth when the eclipse happens, you'll be able to see it. Remembering the Difference It's easy to get these two types of eclipses mixed up. An easy way to remember the difference is in the name. The name tells you what gets darker. In a lunar eclipse, the Sun gets darker. In a lunar eclipse, the Sun gets darker. Eclipses Often when we see drawings of the Earth and the Moon, they look really close together. Don't be fooled! They're actually really far apart. The Moon is an average distance? Well, the Moon is not always the same distance away from Earth. The orbit is not a perfect circle. When the Moon is 225,623 miles away. That's almost 32 Earths. When it's closest, the Moon is 225,623 miles away. That's het we can see it so well without a telescope, but remember, it's farther away. That's het we can see it so well without a telescope. than most people realize! Related Resources for Educators Distance to the Moon (Educator Guide) Launchpad: Moon Magic article last updated July 23, 2021 See All Earth Systems Mini Lessons In this activity students will examine NASA data to determine the differences between a solar and lunar eclipse. An eclipse happens when a planet or a moon gets in the way of the Sun's light. Here on Earth, we can experience two kinds of eclipses and lunar eclipses and lunar eclipses and lunar eclipses and lunar eclipses. A solar eclipses and lunar eclipses. Moon. Check with your instructor on how to submit answers. There are optional student sheets available as a Google Doc or a PDF. Steps: Mind-Melting Facts about the Sun, Credit NASA, Which layer of the Sun is normally visible on a bright, sunny day? Why are scientists so interested in viewing the corona -What is the "Puzzle of Coronal Heating"? Model: What objects could you use to model a solar eclipse and a lunar eclipse? Draw your plans for each model. This product is supported by the NASA HEAT), part of NASA's Science Activation portfolio. Sources: Teachers, these mini lessons/student activities are perfect "warm up" tasks that can be used as a hook, bell ringer, exit slip, etc. They take less than a class period to complete. Learn more on the "My NASA Data What are Mini Lessons?" page. Teachers who are interested in receiving the answer key, please complete the Teacher Key Request and Verification Form. We verify that requestors are teachers prior to sending access to the answer keys as we've had many students try to pass as teachers to gain access. Rare 'Blood Moon' Lunar Eclipse: What you need to knowA total lunar eclipse will be visible across much of the Americas and many regions beyond including Europe and the UK on the night of March 13, weather permitting. The countdown for the year's first total lunar eclipse begins. The celestial event, which will see the moon change to rusty red hues, will occur in the U.S. on the night of March 13-14. According to NASA, another total lunar eclipse won't be visible in the U.S. on the night of Europe and Africa. Those in the U.S. can see the eclipse starting at 11:57 p.m. ET when the penumbral phase begins, during which the moon will complete all of the eclipse phases in just over 6 hours and will end at 6 a.m. ET.Unlike the total solar eclipse in April 2024, the upcoming total lunar eclipse, the first since November 2022, doesn't require special equipment to witness safely. Here's what makes the lunar eclipse occurs when any celestial object like a moon or a planet passes between two other bodies, obscuring the view of objects like the sun, according to NASA.A total lunar eclipse occurs when the moon and the sun are on exact opposite sides of Earth. When this happens, Earth blocks the sunlight that normally reaches the moon. Instead of that sunlight that normally reaches the moon. Instead of that sunlight hitting the moon's surface, Earth blocks the sunlight that normally reaches the moon. because when the Earth's shadow covers the moon, it often produces a red color. The coloration happens because a bit of reddish sunlight still reaches the moon's surface, even though it's in Earth's shadow. The uncommon celestial phenomenon, which Americans haven't had the opportunity to witness for nearly three years, can only occur when the moon is full and aligning perfectly with the Earth and sun. A total solar eclipse occurs when the moon comes in between the Earth and the sun, blocking its light from reaching Earth and leading to a minutes-long period of darkness. The resulting "totality," whereby observers can see the outermost layer of the sun's atmosphere, known as the corona, presents a spectacular sight for viewers and sometimes confuses animals - causing nocturnal creatures to stir and birds and insects to fall silent. Partial eclipses, when some part of the sun, the moon and the Earth and the longevity of the phenomenon, according to NASA. A lunar eclipse lasts only a few minutes Solar eclipses also rarely occur, while lunar eclipses are rare, says NASA. Another major difference between the two is that for lunar eclipses, no special glasses are needed to view the spectacle and one can directly stare at the moon. However, for solar eclipses, it's important to wear proper viewing glasses and take the necessary safety precautions, as the powerful rays of the sun can burn and damage your retinas. Contributing: Eric Lagatta, Janet Loehrke, USA TODAYS amon Shafiq is a trending news reporter for USA TODAY. Reach her at sshafiq@gannett.com and follow her on X and Instagram @saman_shafiq7. An eclipse happens when a planet or a moon gets in the way of the Sun's light. Here on Earth, we can experience between a lunar eclipses and a solar eclipses and lunar eclipses and lunar eclipses. What's the difference between a lunar eclipse and a solar eclipses and lunar eclipses and lunar eclipses. the difference is in the name. The name tells you what gets darker. In a solar eclipse, the Sun gets darker. In a lunar eclipse, the Moon gets darker. In a lunar eclipse, the Sun gets darker. eclipses. Although these two types of eclipses are, in some ways, quite similar, they are also two entirely different occurrences. An eclipse occurs when the Earth and the sun, thus obscuring the sun. A lunar eclipse occurs when the Earth moves directly between the sun and the moon. Either type of eclipse can be total or partial. A total eclipse occurs when only part of the sun or moon is blocked out. Solar eclipses can also be annular, meaning that the moon is at its furthest point in its orbit where it will not completely block out the sun. A lunar eclipse can also be penumbral, which, in its simplest terms, means that the eclipse shadow is only partial. This type of lunar eclipse can be difficult to observe. One of the most obvious differences between a solar eclipse and a lunar eclipse is the times at which each can occur. Solar eclipses can only happen during the day, while lunar eclipses only occur during the night. Lunar eclipses can only occur during a full moon. Because of the exact situations that need to occur for an eclipse to happen, they are relatively rare, only happening a few times a year. It is not safe to stare at a solar eclipse. Permanent damage can be done to your eyes if you look at the sun for too long, even during an eclipse. Lunar eclipses, however, are completely safe to view. This is because of the relative location of the sun. During a solar eclipse, the sun is still shining potential harmful light which is reflected off of the moon. Lunar eclipses tend to happen significantly more often than solar eclipses, because the moon is much greater than the moon getting between the sun and the Earth. A solar eclipse was often seen as a bad omen in ancient cultures. Although there are major visual differences, the actual effect of either the sun or moon being blocked out is similar for both types of eclipse. A dark circular shadow (either from the moon or the Earth) slowly moves across the celestial object being eclipse. Similarities Between The Lunar & Solar Eclipse" sciencing.com, . 9 March 2018. APA Black, Michael. (2018, March 9). Differences & Similarities Between The Lunar & Solar Eclipse last modified March 24, 2022. Do you know the difference between a solar eclipse and a lunar eclipse on Monday, April 8. Although they are very different phenomena, they are caused by the same celestial alignment. A lunar eclipse happens when Earth's shadow is projected onto the moon, while a solar eclipse happens when the moon blocks the sun's light and causes a shadow on Earth. However, both types of eclipses are rare because the orbital planes of the Earth and the moon around the sun and the moon and projects a shadow into space. Full moons happen every 29 days, of course, but the moon is between the sun and Earth's shadow. When it does, that's a lunar eclipse can only happen at a new moon, when the moon is between the sun and Earth and projects a shadow onto Earth. A new moon happens every 29 days—two weeks after a full moon—but rarely does the moon block the sun as seen from Earth. When it does, that's a solar eclipse. What causes eclipses? getty A perfect alignment of the sun, Earth has two shadows—its fuzzy outer penumbral shadow and its dark central umbral shadow. When a full moon drifts into Earth's umbra, it receives no direct light from the sun. The only light on its surface is sunlight refracted by Earth's atmosphere. The effect is a thousand sunsets on the lunar surface, which turns a pinkish-red light and see a partial or total solar eclipse. On March 25, there will be a penumbral lunar eclipse because the full "Worm Moon" will only move through Earth's penumbra. The moon blocks out the sun as the arm from the sculpture The Awakening reaches out to it in ... More Chesterfield, Mo. on Monday, August 21, 2017. (David Carson/St. Louis Post-Dispatch/Tribune News Service via Getty Images) Tribune News Service via Getty Images A perfect alignment of sun, moon and Earth—and a celestial fluke—are what cause a total eclipse of the sun. A new moon perfectly blocks all of the sun—something it can only do because it just happens to be 400 times smaller than the sun but also 400 times closer to Earth—its umbra is projected onto Earth. This shadow of the moon moves across Earth's orbiting from west to east. That's also the direction that Earth rotates, which slows down the movement of the moon's shadow. It creates an umbral shadow—a path of totality—that those within can see something incredible: a total eclipse of the sun. If you were standing on the moon's shadow crossing Earth. On April 8, there will be a total solar eclipse, you would see the moon's shadow over North America. Why Lunar And Solar Eclipses Are Rare Eclipses of all kinds are relatively rare because the moon's orbit around Earth is tilted about 5 degrees with respect to the sun twice in each orbit—each month—but it must be at its new or full phase to cause a solar or a lunar eclipse. This scenario happens twice yearly, creating two "eclipses are penumbral or partial. The phases of a total lunar eclipses are penumbral or partial. The phases of a total lunar eclipses are penumbral or partial. The phases of a total lunar eclipses are penumbral or partial. The phases of a total lunar eclipses are penumbral or partial. The phases of a total lunar eclipse "Blood Moon." getty When The Next Lunar And Solar Eclipses are penumbral or partial. be two "eclipse seasons" in 2024, starting on March 25 and September 17, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Total solar eclipse (visible in North America) April 8, 2024: Total solar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Total solar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: Penumbral lunar eclipse (visible in North America) April 8, 2024: America) When The Next Lunar And Solar Eclipses Are In 2025 There will be two "eclipse seasons" in 2025, starting on March 13 and September 7: March 13, 2025: Total lunar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Partial solar eclipse (visible in North America) March 29, 2025: Part 21: Partial solar eclipse (visible in Antarctica) For the latest on all aspects of April 8's total solar eclipses and wide eyes. Do you know your eclipses?From "blood moon" and "ring of fire" eclipses to total eclipses and deep or shallow partials, eclipses come in various types. However, one key question forms the basis of the conversation: What's the difference between a solar eclipse? Here's everything you need to know about how the positions of Earth, the moon and the sun combine to create some of the sky's most spectacular events. You may like What causes a solar eclipse? A solar eclipse happens when the moon moves between the sun and Earth, blocking the sun's light and casting a shadow on Earth. This can occur only during a new moon, when the moon is positioned in front of the sun. However, the moon's orbit is tilted by about 5 degrees, so it usually misses the sun from our perspective. Only when it aligns perfectly do we witness a solar eclipse. How can that happen when the sun? As luck would have it, the sun is 400 times farther from Earth than the moon is, causing them to appear almost the same size in our sky. The next total solar eclipse will occur on Aug. 12, 2026, and will be visible from Greenland, Iceland and Spain. A composite of the trail of the total solar eclipse on April 8, 2024. (Image credit: Mark Chivers via Getty Images)What causes a lunar eclipse occurs when Earth gets between the sun and the moon, causing Earth's shadow to be projected onto the lunar surface. By definition, this can happen only during a full moon, Although full moons occur roughly every 29 days, lunar eclipses are relatively rare because the moon's orbit is slightly tilted relative to Earth's orbit around the sun. As a result, the moon usually passes above or below Earth's orbit around the sun. As a result, the moon usually passes above or below Earth's orbit around the sun. As a result, the moon usually passes above or below Earth's orbit around the sun. America, and glimpsed from parts of Europe and New Zealand. A composite of the total lunar eclipse on Sept. 28, 2015. (Image credit: Christophe LEHENAFF / Getty Images)How often do eclipses occur?Every calendar year, there are two "eclipse seasons," each of which lasts between 31 and 37 days, that can create between four and seven eclipses according to NASA. These eclipse seasons are periods when the alignments of Earth, the moon and the sun cause either a full moon to move through Earth's shadow or a new moon to appear to pass across the sun's disk. Eclipses don't happen every month because the moon orbits Earth on an orbital path that's slightly different from the ecliptic (the sun's path through our daytime sky). Although that orbital path is tilted by 5 degrees to the ecliptic, it intersects it twice each month. The moon usually crosses the ecliptic, a solar eclipte occurs. When a new moon crosses the ecliptic, it results in a lunar eclips When one happens, the other follows, which is why there are typically two eclipses within an eclipse season, separated by two weeks. A diagram illustrating how eclipses are created. (Image credit: Ron Miller/Stocktrek Images) Types of solar eclipse types. During a partial solar eclipse, a new moon appears to move across part of the sun, blocking it from view. This event must be viewed through solar eclipse glasses, and solar filters must be used on cameras, binoculars and telescopes. Related: Best solar viewing gear 2025: Observe partial and total eclipses in safetyDuring an annular solar eclipse, the moon covers only the center of the sun's disk, leaving a bright "ring of fire" around its edges. This is also dangerous to look at without eye protection. The entire event is a kind of partial solar eclipse — the moon completely covers the sun, revealing the sun's outer atmosphere, called the corona, during totality totality totality event is a kind of partial solar eclipse. In contrast, during a total solar eclipse — the moon completely covers the sun, revealing the sun's outer atmosphere, called the corona, during totality totality event is a kind of partial solar eclipse. That's the only time it's safe to look at a solar eclipse with the naked eye, since all of the sun's light is blocked. The existence of annular and total solar eclipses is explained by the moon's slightly elliptical orbit, which means its apparent size waxes and wanes over the course of a month. Types of lunar eclipse has between one and five phases. During a penumbral lunar eclipse, the moon passes only through Earth's outer, lighter penumbral shadow, with a slight dimming as the only visual effect. If it moves through Earth's penumbra and then part of it goes through its umbra — the darkest part of the shadow — that part of the moon goes dark in a partial lunar eclipse. When these phases are followed by the moon fully entering the umbra, there is a "blood moon" total lunar eclipse, when the entire lunar surface turns red during totality. The effect happens when sunlight is filtered by Earth's atmosphere. As the moon leaves the umbra, a partial — and then penumbral — eclipse is visible. Therefore, a total lunar eclipse has five distinct phases. Unlike with a solar eclipse, all phases of a total lunar eclipse are safe to look at with the naked eye. How often do solar and lunar eclipses tend to be the crowd-pleasing eclipse are partial, and most lunar eclipses are penumbral or partial. A total solar eclipse is visible from somewhere on Earth roughly every 18 months, but it is a rare event for any given location on Earth, occurring about once every 2.5 years, according to Time and Date. Additional resourcesRead more about solar and lunar eclipses on Eclipse Wise — a website dedicated to predictions of eclipses. Learn about eclipses," from Science ABC.BibliographyNASA, "What is the Difference between a Solar Eclipse," accessed Feb. 25, 2025. "The Moon & Eclipse," accessed Feb. 25, 2025. Hocken and Aparna Kher. "What Is a Total Lunar Eclipse?" Accessed Feb. 25, 2025. "The Moon & Eclipse," accessed Feb. 25, 2025. Hocken and Aparna Kher. "What Is a Total Lunar Eclipse?" Accessed Feb. 25, 2025. "The Moon & Space." Time and Date, 20 February 2025, Accessed 6 March 2025. Breaking space news, the latest updates on rocket launches, skywatching events and more! Header Image: Eclipse of the Sun illustration from the Adler Planetarium's Collections Editor's Note: This blog was originally published in April 2021 and was updated and republished with more current information. There are several topics in astronomy that get lots of people excited: naked-eye visible comets, bright planets, auroras...but eclipses are generally at the top of the observing list for many of us. We love seeing the Sun or Moon look different from how they normally appear. Keep reading to learn more about the two types of eclipses: lunar and solar. Lunar Eclipses Explained Image Caption: The Moon is seen during a total lunar eclipse, Tuesday, Nov. 8, 2022, at NASA/Joel Kowsky What causes a lunar eclipse? Sunlight falls on our Earth, and the Earth's shadow is cast into space behind it—just like when the sunlight falls on you, and your shadow is cast behind you. If the Moon happens to pass through the Earth's shadow, then we'll see the Moon appear to darken. We call this a lunar eclipse can only happen at the phase known as full Moon, when the arrangement in space is a line between the Sun, Earth, and Moon when the Moon is opposite the Sun in our sky. While a full Moon phase. Why? The Moon's orbit with respect to the Earth-12 or 13 times each calendar year—we don't get a lunar eclipse at each full Moon phase. Why? The Moon's orbit with respect to the Earth's shadow at full Moon. When the lineup is exactly right and the Moon jasses through the shadow, and we see the Moon passes through the lighter outer part of Earth's shadow or the darker inner part of Earth's shadow. If the Moon passes through part of the lighter shadow area—known as the penumbra lunar eclipse. If the Moon passes through part of the Earth's shadow, this is a penumbra lunar eclipse. If the Moon passes through part of the Earth's shadow, this is a penumbra lunar eclipse. If the Moon passes through part of the Earth's shadow, this is a total lunar eclipse. Don't have a telescope at home? Observe astronomical events virtually with the Adler's astronomy educators. We host regular episodes of Sky Observers Hangout, so be sure to subscribe to our YouTube channel for updates. Solar Eclipses Explained When the Moon's orbit is aligned just right for a lunar eclipse, it also means it's aligned just right for a solar eclipse. A lunar eclipse always occurs about two weeks after a solar eclipse set. How Do Moon Phases Affect Solar Eclipses? Image Caption: This Adler Planetarium infographic shows the phases of the Moon. A solar eclipse can only happen at the phase known as new Moon, when the arrangement in space is a line between the Sun's position in our sky, the Moon partly or totally covers the Sun. Solar eclipses can be partial or total, depending on whether the Moon covers part or all of the Sun. If the Moon is close enough to cover the Sun, but when the Moon is farther from the Earth, the size it appears in the sky is not large enough to cover the Sun. When the Moon is farther from the Earth, the size it appears in the sky is not large enough to cover the Sun. The word annular comes from the Latin word annulus, which means ring, referring to the ring of Sun that is left around the Moon during this type of eclipse. You will always need proper solar viewing glasses to safely view the Sun. Do not look directly at the Sun without certified solar eye protection. If you have glasses or viewers left over from a previous solar eclipse, only use them if you have stored them away from light, heat, and humidity and you are certain they do not have any pinholes or punctures. If you aren't sure if your viewers are safe, when in doubt, buy new ones. Learn More About Sky Observing From Our Astronomy Educators Watch exclusive live episodes of Sky Observers Hangout! With our astronomy educators you'll learn how to observe upcoming cosmic happenings, enhance your astrophotography skills, and see celestial objects through a telescope virtually including all types of eclipses. If you are not able to tune in live with us, you can watch recaps of the episodes on our YouTube channel. Tour the night sky with Skywatch Wednesday host Nick who uses cutting-edge visualizations, NASA images, and astrophotography to show you what you can see in the night sky. Need some space in your inbox? Sign up for our emails to get the latest breaking space news, Adler happenings, and updates for upcoming live Sky Observer Hangout episodes. Explore the captivating phenomena of solar and lunar eclipses. Our comprehensive guide compares their unique characteristics, occurrences, and scientific explanations. In the great theater of the cosmos, few events can rival the awe-inspiring spectacle of an eclipse. These celestial dances, involving the sun, the moon, and our home planet, have captivated humanity since time immemorial, stirring a mix of fear, wonder, and scientific curiosity. Welcome to our comprehensive comparative guide, exploring the captivating phenomena of solar and lunar eclipses. The Moon orbits the Earth at an average of 238,855 miles (384,399 km) away in an elliptical orbit once every 27.322 days, creating phases in our night sky as its illuminated side points toward us and away from us at different angles in different parts of its orbit. The most dramatic of which are known as eclipses. Eclipses occur when one astronomical body appears to cover another body from the observation of a third body. In this case, we see the Moon appear to cover the Sun from our perspective here on Earth or see the effect of the Earth covering the Sun on the Moon's slight 5-degree tilt relative to its axis and the plane of orbit and the 23.5-degree axial tilt of the Earth, an eclipse does not occur each month as the Moon orbits the Earth. Anywhere from four to seven times a year, these three astronomical bodies line up just right to create these dramatic shadow shows. There are two types of eclipses: solar and lunar, determined by which body is being eclipsed. Solar EclipsesLet's start with the one you are probably most familiar with: the solar eclipse. During a solar eclipse, the Moon appears to cover up the Sun. While the Moon's diameter is 400 times smaller than the Sun's, it is also roughly 400 times closer to Earth than the Sun, meaning that not every moon in the solar system eclipses the Sun like ours does. In fact, there are size in our sky. Moon did not always eclipse the Sun and will not always continue to do so. It started much closer to the Earth and has been slowly drifting outward at about 1.5 inches (3.8 cm) per year. In about 600 million years, it will move far enough away that it will be too small from the perspective of Earth to cover the Sun. Solar eclipses happen at the New Moon phase when the Moon is directly between the Sun and the Earth, but doubly so. Normally, during the New Moon phase, the moon crosses directly across the Sun, covering it and casting a shadow across the Earth, blocking or partially blocking our view of the Sun. Solar eclipses are only visible within this shadow (only about 300 miles or 480 km wide) and therefore cover a small area of Earth, often over the ocean, making it rarer to observe one unless you schedule it ahead of time. This shadow has two parts: the umbra where the Sun is completely blocked and the penumbra where the Sun is partially obscured. Observers in the umbra will see a total eclipse while those in the penumbra will see a partial eclipse. The shadow may be narrow with the total eclipse only lasting a few minutes, but Earth rotates fast enough that the shadow may be narrow with the total eclipse. the Sun. solar eclipse timeline A Few Quick Safety PointsDirectly looking at the Sun for any period of time is dangerous as it can cause damage to your eyes. Usually, we don't have to worry about this as we don't have a reason to observe the Sun for extended periods of time. time. Eye safety is paramount when planning for an eclipse.***Except for the few minutes of totality during a total solar eclipse, observers MUST use a safe viewing methods like a pinhole projector. Otherwise, they risk eye damage from staring at the direct light from the Sun for so long. Check out more about solar eclipse viewing safety here.***Be on the lookout for local community observing events that will often have safe viewing methods available such as eclipse glasses, telescopes with solar filters, and pinhole projector activities. Many people worry about other effects such as increased radiation or if their pets will be safe. The Sun isn't putting out extra radiation. The Moon is simply passing in front of it. If you are observing the eclipse, implement proper eye protection methods and make sure you protect yourself as you would with any other outdoor activity such as wearing weather-appropriate clothing and sunscreen. Your pets won't be looking at the Sun so they won't have any issues. They may become nervous or confused during the event, especially if they are outside, but you don't need to worry about protecting their eyes or leaving them inside all day. There is no concern for pregnant women or other people vulnerable to various forms of radiation during an eclipse outside of the concerns already mentioned.Types of Solar EclipsesThere are four types of solar eclipses, depending on the angles of the different astronomical bodies.Total Solar EclipseWhen the Sun. Observers located in the center of the Moon's shadow across Earth's surface, the umbra, will experience a total solar eclipse during which the sky will darken to dusk levels. Birds and other animals will quiet as they do at night, creating a surreal and eerie experience. You can see why people of ancient cultures often interpreted total solar eclipse, as bad omens. The Sun's corona, outer atmosphere, is visible during totality during a total solar eclipse, as bad omens. The set why people of ancient cultures often interpreted total solar eclipse, as bad omens. The set will dark be a surreal and eerie experience. You can see why people of ancient cultures often interpreted total solar eclipse, as bad omens. The set will dark be a surreal and eerie experience. appearing as streaks emanating from the Sun. It is normally obscured by the brightness of the Sun's light. Again, only during the few minutes of totality, when the Sun. In the moments leading up to and after totality, eclipse glasses or other approved solar viewing methods are required. There was a total solar eclipse on April 20th of this year with the shadow passing across Australia and the surrounding waters, with most of totality being over the ocean. The next total solar eclipse in the U.S. will be on April 8, 2024. The last American total solar eclipse in 2017 spread eclipse fever across the nation, causing eclipse glasses shortages and more. Plan ahead to avoid issues. If you don't live within the path of totality and are planning to book up. Annular solar eclipse, the Moon passes between the Sun and Earth exactly but it is at or near its farthest point from Earth, meaning it appears smaller than the Sun and does not completely cover it. In this type of eclipse, the Moon Appears as a dark disk on top of a larger, brighter disk, creating a ring around the Moon. This is still a fantastic, surreal, and awe-inspiring event and one worth traveling to see if possible. Since totality does not occur, solar eclipse glasses must stay on for the entirety of the eclipse. The next annular eclipse in the U.S. will be on October 14, 2023. The penumbra will cover most of North and South America with the umbra (darkest inner shadow) traveling in a narrow band from South of Portland, Oregon down through Northern Nevada Southern Utah, the middle of New Mexico, along the Southern border of Texas, and then through Central America, Columbia, and Brazil.Partial Solar EclipseDuring a partial solar eclipse, the Moon passes between the Sun and Earth, but they are not perfectly lined up. Only a part of the Sun will appear covered, giving it a crescent shape. During a total or annular solar eclipse, observers outside of the area covered by the Moon's inner shadow (umbra) but within its outer shadow (penumbra) will see a partial solar eclipse. Again, safe solar observing methods such as eclipse glasses will need to stay on for the entire eclipse. circular body with a curved surface, an eclipse can sometimes shift between annular and total as the Moon's shadow moves across the globe, creating what is known as a hybrid eclipse. Fun fact: Eclipses come in pairs. Lunar eclipses occur about two weeks after or before a solar eclipse, when the moon is on the other side of the Earth. Lunar EclipsesIn contrast, a lunar eclipse occurs when the Earth is perfectly between the sun and the moon at full moon phase and the Earth's shadow falls across the face of the Moon. Similar to a solar eclipse, there are different levels of a lunar eclipse depending on the angles at which everything lines up and how much of the moon enters the different levels of shadow. lunar eclipse how it works infographic There are three types of lunar eclipses, depending on how far the moon moves into the Earth's shadow. It is not dramatic and is often mistaken for a regular Full Moon simply with some cloud cover.Partial lunar eclipseWhen the Earth moves between the Sun and the Full Moon, but are not perfectly aligned. Only part of the Moon's visible surface moves into the umbra. Total lunar eclipse (a.k.a. a Blood Moon)When a full Moon is completely blocked from the Sun's rays by Earth's atmosphere bends sunlight and indirectly illuminates the Moon's surface, giving it a red-orange hue. A lunar eclipse can also be yellow, orange, or brown in color based on different types of dust particles or clouds in Earth's atmosphere that allow different wavelengths of light to reach the surface of the Moon.During a total lunar eclipse, there are seven stages which include the previous two types of eclipses: Penumbral eclipse begins - Earth's umbra starts covering the Moon, making the eclipse more visible as the orange-red hue traces its way across the moon as the minutes tick by. Total eclipse begins - Earth's umbra completely covers the Moon and the whole Moon becomes red, brown, or yellow in color. Maximum eclipse - the period of total, absolute coverage of the moon in the Earth's umbra.Total eclipse ends - Earth's umbra starts moving away from the Moon's surface, revealing more and more of the normal hue of the Moon's surface, with no more hues.Penumbral eclipse ends - Eclipse ends Moon. Check out our Lunar Eclipse Calendar to plan ahead. a timelapse of a total lunar eclipse How to View a Lunar Eclipses as you are not looking at the sun, but the moon, which reflects a portion of the sun's light. It is completely safe to view the lunar eclipse as you would a full moon. Lunar eclipses are much more egalitarian than solar eclipses as essentially the half of the Earth that is facing the moon at that moment (the night side of the Earth) will be able to view the eclipse. Simply find a good location for stargazing. Even in the city, you will likely have a decent viewing of it as long as the sky is clear (no clouds) and you can see the moon (nothing blocking the part of the sky where it is such as buildings or trees). Your eyes will be more than sufficient. Telescope are often not recommended for viewing the moon as they are a bit overkill for something so close. If you do have a small telescope or binoculars, lunar observing is best done at the edge of the moon so that your viewing device and your eyes are not overwhelmed by the amount of light being reflected off the full moon's surface. International Observe the Moon Night is on October 21st this year providing a wonderful opportunity to learn about the moon right before the Partial Lunar Eclipse. In summary, check out the table below: Type of EclipseOrientationVisibilityEye Safety Required?Total Solar EclipseSun-Moon-Earth Perfect line-upMoon will slowly pass in front of the Sun as a dark disk, covering more and more. At totality, viewers in the umbra's path, partial solar eclipse in the penumbra's path. Yes, except for the few minutes of totalityAnnular Solar EclipseSun-Moon-Earth perfect line-up but the Moon is at or near its farthest point away from Earth and therefore too small to fully cover the Sun As a dark disk, covering more and more. "Totality" will appear as a dark disk covering a slightly larger bright disk, partial solar eclipse (again with a smaller disk) in the penumbra's path. Yes, throughout the eventPartial Solar EclipseSun-Moon-Earth but not perfectly lined up due to being outside the umbra path, but in the penumbraMoon will slowly pass in front of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk, covering more and more. Only a part of the Sun as a dark disk. umbra's path, giving it a crescent shape.Yes, throughout the eventTotal lunar eclipseSun-Earth-Moon perfectly lined up Creates seven stages of penumbral, partial, and maximum eclipse. At maximum, the moon will be completely in Earth's shadow and often tinged red (or other colors depending on the particles in the atmosphere).NoPartial lunar eclipsesSun-Earth-Moon imperfectly lined up, passing through only part of the Earth's umbraParts of the moon lie in shadow, often with a red-orange hueNoPenumbral lunar eclipsesSun-Earth-Moon lined up, but the Moon is only in the penumbra, the faint outer shadowMoon appears lighter, could completely miss itNoConclusionEclipses occur when three astronomical bodies line up perfectly in such a way that one covers the other from the Earth and the Moon currently qualify so that we have solar and lunar eclipses, the former where the Moon covers up the Sun from the Earth and the Moon currently qualify so that we have solar and lunar eclipses, the former where the Moon currently qualify so that we have solar and lunar eclipses. casting a shadow across the Moon's surface. Both are surreal events and contain variations of totality is relatively small and often occurs over the ocean. We hope that this Eclipses do not. Planning ahead is vital for both, but especially for total solar eclipses as the path of totality is relatively small and often occurs over the ocean. We hope that this Eclipse Guide has a state of total solar eclipses as the path of t helped you better understand these events and prepare for the upcoming eclipses coming to your area of the globe. The Moon has "phases." That means it looks with terms such as "Full Moon," "First Quarter," and "New Moon" (which we can't really see, because the side that is lit faces away from us). The Moon has no light of its own. Moonlight is sunlight bouncing off the Moon's facing it. To the Sun, it's always a full Moon! If you were looking down upon Earth and its Moon from way out in space over the North Pole, you would see a Moon that looked like one of these: Credit: NASA/JPL-Caltech But we see the Moon. Credit: NASA/JPL-Caltech What is the current phase of the Moon? Use this tool to see the current Moon phase and to plan ahead for other Moon views. Credit: NASA Related Resources for Educators Our World: Moon Phases article last updated March 29, 2024 Imagine standing under a sky painted with the hues of twilight, as the world around you seems to hold its breath. You're witnessing one of nature's most captivating spectacles: an eclipse. But what exactly sets a solar eclipse apart from a lunar one? These celestial events, though similar in their ability to mesmerize, unfold in remarkably different ways. A solar eclipse occurs when the Earth and the sun, casting its shadow and momentarily dimming daylight. In contrast, a lunar eclipse takes place when the Earth positions itself between the sun and the moon, causing Earth's shadow to dance across the lunar surface. Each type of eclipse offers its own unique experience, inviting you to explore the cosmic choreography that governs our universe. Understanding these differences not only enhances your appreciation but also deepens your connection to the celestial wonders above. An eclipse occurs when one celestial body moves into the shadow of another. In a solar eclipse, the moon, positioned between Earth and the sun, temporarily blocks sunlight creating a day that dims into night. During this celestial alignment. On the other hand, a lunar eclipse happens when Earth sits between the sun and the moon. Earth's shadow envelops the moon, revealing a copper-red hue often called a "blood moon." This spectacle captivates night owls, inviting reflections on the cosmic order. Imagine ancient societies staring at the sky confused, assigning mythical interpretations to these events. Questions swirl: why does the sun vanish? How does the moon turn red? These mysteries have fueled curiosity, leading to scientific exploration. Remember the beauty of eclipses lies in their fleeting nature, urging you to appreciate life's transient moments. A solar eclipse occurs when the moon aligns perfectly between the Earth and the sun, casting a shadow on Earth's surface. This celestial event captivates observers and momentarily alters daylight. Four primary types of solar eclipses, for example, render the sun completely obscured by the moon, creating a brief period of darkness known as totality. Annular eclipses differ, featuring a "ring of fire" effect, as the moon covers the sun's center but leaves its edges visible. Hybrid eclipses, rare in occurrence, shift between total and annular as the eclipse path crosses Earth. Finally, partial eclipses only cover part of the sun, causing a crescent-shaped shadow. The mechanics of solar eclipses hinge on precise alignments in space. During distinct phases, the moon's orbit intersects the sun-Earth plane, casting its shadow onto Earth. These events vary in frequency, with total eclipse path approximately every 18 months. The umbra, or central shadow, results in a total eclipse path experience these breathtaking events firsthand, while others watch from afar. Lunar eclipses captivate with their atmospheric beauty. They occur when Earth's shadow covers the moon, resulting in a mesmerizing celestial event. Three primary types of lunar eclipses exist: total, partial, and penumbral. Total lunar eclipses paint the moon with a copper-red hue, often called a "blood moon," as Earth's umbra completely covers the moon, Partial eclipses are subtler, with Earth's penumbral shadow causing a slight shading on the moon's surface, making it less noticeable to the casual observer. The mechanics of lunar eclipses revolve around the Earth situated between the sun and the moon. When these three celestial bodies align precisely around the full moon phase, Earth's shadow falls on the moon. If earth situated between the sun and the moon. The shadow has two components: the umbra, the lighter outer shadow. If the alignment isn't perfect, a partial or penumbral eclipse occurs, with the moon only partially entering Earth's shadow. Observing a lunar eclipses, safety measures like evewear aren't necessary, as the moon's reflected light is gentle on the eves. Solar and lunar eclipses offer distinct experiences based on their visibility, duration, and viewing methods. A solar eclipse occurs when the moon passes between the Earth and sun. You only witness it in specific areas along the path of totality. In contrast, a lunar eclipse can be seen by anyone on the night side of Earth when the Earth is aligned between the sun and moon. Solar eclipses are less frequent, happening approximately every 18 months in any given location, while lunar eclipses can last for several hours. During a total solar eclipses, the day turns into twilight and stars become visible. In a lunar eclipse, the moon takes on a copper-red hue, known as a "blood moon," due to Earth's atmosphere bending sunlight. While solar eclipses do not. You safely watch a lunar eclipses with the naked eye. Create a viewing experience for solar eclipses by using eclipse glasses or pinhole projectors. Lunar eclipses provide a more relaxed viewing opportunity, perfect for appreciating the celestial dance. Eclipses, both solar and lunar, hold deep cultural, historical, and scientific significance. These celestial events have influenced various aspects of human society and understanding of the universe. Cultural interpretations of eclipses vary widely but often depict them as powerful omens. In ancient China, people believed a dragon consumed the sun during a solar eclipse, leading to rituals aimed at frightening the moon, prompting loud noises to ward it off. These myths illustrate how cultures historically attempted to explain and influence these awe-inspiring events. Eclipses aren't just about myth; they've played significant roles in historical documentation and planning. For instance, ancient Greek historian Thucydides chronicled eclipses to date wars or events. and understanding astronomy. From a scientific standpoint, eclipses provide rare opportunities to study celestial bodies and their dynamics. Solar eclipses enable scientists to observe the solar corona, the sun's outer atmosphere, which is usually obscured by its bright light. space weather, impacting satellite operations on Earth. Lunar eclipses, on the other hand, offer insights into Earth's atmosphere. As sunlight passes through Earth's atmosphere during a total lunar eclipse, it scatters, giving the moon its red hue. Analyzing this red light helps scientists study the composition and density of the atmosphere. Research during eclipses has led to groundbreaking discoveries. In 1919, observations during a solar eclipse confirmed Albert Einstein's theory of general relativity. Such studies emphasize the critical role eclipses play in expanding scientific knowledge. celestial events. Each type of eclipse offers a unique spectacle and a chance to reflect on our connection to the universe. Whether you're witnessing the dramatic shadow of a solar eclipse or the enchanting glow of a lunar eclipse, these moments remind you of the intricate dance between the Earth, moon, and sun. as opportunities to marvel at the wonders of the cosmos, enhancing your awareness of the universe's beauty and complexity. Eclipses have captivated humanity for millennia, offering a glimpse into the vast celestial mechanics of the universe. Two types of eclipses are most commonly observed on Earth: solar eclipses and lunar eclipses. Both events involve the alignment of the Earth, moon, and sun, yet they are distinct in how they occur and the visual experience they provide. For tourists visiting Iceland, the opportunity to witness a solar or lunar eclipse in such a stunning natural environment is a once-in-a-lifetime experience. This article will explore the key differences between solar and lunar eclipses, when and how they occur, and what to expect when viewing them. We'll also highlight some prime viewing locations, including Reykjavik's famous Perlan. What is a Solar Eclipse? A solar eclipse occurs when the moon passes directly between the Earth and the sun, casting a shadow on parts of the Earth and temporarily blocking the sun's light. This celestial alignment can result in different types of solar eclipses, depending on how much of the moon obscures the sun. Types of Solar EclipsesHere are the main types of solar eclipses. Total Solar EclipsesHere are the moon completely covers the sun. Types of Solar EclipsesHere are the moon obscures the sun. Types of Solar EclipsesHere are the moon obscures the sun. Types of Solar EclipsesHere are the moon obscures the sun. briefly turns into twilight, and the sun's outer atmosphere becomes visible, creating a stunning halo effect. Iceland is poised to experience a total solar Eclipse on August 12, 2026, which will be a spectacular event for tourists and locals alike. Partial Solar Eclipse on August 12, 2026, which will be a spectacular event for tourists and locals alike. Partial Solar Eclipse on August 12, 2026, which will be a spectacular event for tourists and locals alike. Partial Solar Eclipse on August 12, 2026, which will be a spectacular event for tourists and locals alike. crescent shape, but the sky does not go completely dark as it would in a total eclipse. Annular Solar EclipseSometimes referred to as a "ring of fire," this eclipse occurs when the moon is farther from the Earth in its elliptical orbit, so it appears smaller than the sun. Instead of covering the sun completely, it leaves a bright ring around the edges. How Solar Eclipses OccurSolar eclipses occur only during the new moon phase when the moon's orbit is slightly tilted relative to Earth's orbit. They are relatively rare events, often visible from specific parts of the Earth and only for a brief period.What is a Lunar Eclipse? A lunar eclipse occurs when the Earth passes between the sun and the moon, casting a shadow on the moon. This event is visible from anywhere on the night side of the Earth, making it more accessible to more people than a solar eclipse. Types of Lunar Eclipses Total Lunar Eclipse of eclipse, the Earth's shadow completely covers the moon, giving it a reddish hue, often called a "blood moon." This occurs because sunlight passing through Earth's atmosphere gets scattered, allowing only red light to reach the moon. Partial Lunar EclipseDuring a partial lunar eclipse, only part of the moon enters Earth's shadow, while the rest remains illuminated by the sun.Penumbral Lunar Eclipse This subtle eclipse occurs when the moon passes through the Earth's faint outer shadow or penumbra. It can be hard to notice with the naked eye, as the moon only slightly darkens. How Lunar Eclipses CocurLunar eclipses can only occur during a full moon, when the moon is directly opposite the sun, with the Earth in between. Unlike solar eclipses, which can only be seen from specific locations on Earth, lunar eclipses are visible from anywhere on the planet's night side. This makes lunar eclipses more frequent and accessible to a larger audience. Key Differences Between Solar and Lunar Eclipses are visible from anywhere on the planet's night side. between the Earth and the sun, casting a shadow on Earth. Meanwhile, a lunar eclipses occur only during a new moon phase, while lunar eclipses occur only during a shadow on the moon. When the Earth passes between the sun and the moon, casting a shadow on the moon. When the Earth passes between the sun and the moon, casting a shadow on the moon. When the Earth passes between the sun and the moon phase, while lunar eclipses occur only during a new moon phase. parts of the Earth's surface, and the path of totality is usually narrow. Lunar eclipses are visible from anywhere on the night side of Earth, making them easier to observe. TimingA solar eclipse lasts for only a few minutes in any given location. A lunar eclipse can last for several hours, with the total phase often lasting over an hour. SafetyViewing a solar eclipse requires special eye protection, such as solar eclipses in IcelandIceland is an ideal location for viewing both solar and lunar eclipses. Tourists planning to visit Iceland during a solar eclipse can look forward to stunning vistas as the sky darkens and the eclipse takes centre stage. One of the best locations in Reykjavik where you can view an eclipse is Perlan. Perlan's observation deck offers panoramic views of the surrounding city and landscape, making it an excellent spot to witness celestial events like the 2026 total solar eclipse. Perlan also features exhibitions on Iceland's natural wonders, including volcanoes, glaciers, and the Northern Lights, offering a full experience of Iceland's natural beauty alongside the eclipse. FAQsWhat is the difference between a solar and lunar eclipse? A solar eclipse happens when the moon blocks the sun by passing between the Earth and the sun, casting a shadow on Earth. A lunar eclipse occurs when the Earth is between the sun and the moon, casting a shadow on the moon. What is rarer, lunar or solar eclipses are rarer than lunar eclipses are more frequent and can be observed anywhere on Earth's night side. Do lunar eclipses happen at night?Yes, lunar eclipses always occur at night when the moon is fully illuminated by the sun and is positioned opposite the sun, allowing Earth's shadow to fall on it. How often does a solar eclipses are much rarer in any given location. For example, the next total solar eclipse visible in Iceland will occur on August 12, 2026.