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On April 8, 2024, the maximum duration of totality anywhere along the eclipse path will be 4 minutes 28 seconds. For comparison, the maximum length of totality for the last total solar eclipse to cross the continental U.S., which occurred on Aug. 21, 2017, was just 2 minutes 40 seconds.Indeed, some eclipse totalities last but a few seconds. And the longest eclipse totality from 2000 B.C. to A.D. 3000 is 7 minutes 29 seconds. That eclipse will occur July 16, 2186. What Determines The Length Of A Solar Eclipse?So why aren't all totalities 7½ minutes long?The explanation for this goes way back to the time of the German astronomer Johannes Kepler, who lived from 1571 until 1630. In the fall of 1600, Kepler began working for the Danish astronomer Tycho Brahe, who had for years been accumulating observational data on the planets. Tycho paid Kepler to analyze the data. But in October 1601, Tycho suddenly died and Kepler became the imperial mathematician, a position he held for 11 years.During Kepler's first four years, he concentrated on trying to make the orbit of Mars fit Tycho's observations. He initially assumed a circular orbit for the Red Planet, but that didn't work. Neither did a variety of egg-shaped orbits. Then, in early 1605, he tried an ellipse, and it worked to a high degree of accuracy. He immediately assumed that all the planets moved this way and formulated the first of his three laws of planetary motion: Planets move in elliptical orbits.As you might guess, astronomers also see elliptical orbits when they look at moons around planets. None have circular orbits; they all move along elliptical paths.The thing about a body in an elliptical orbit is that its distance from the object it orbits is always changing. Sometimes it's farther from its "primary," or another times it's closer. Now we start to understand why the Moon's orbit lasts 1 second, 1 minute, or 7½ minutes, it has to do with both the changing distance of Earth from the Sun and the changing distance of the Moon from Earth.As our planet orbits the Sun, its distance changes from a minimum of 91.4 million miles (147 million kilometers) around Jan. 4, to a maximum of 94.5 million miles (152 million km) around July 4. That's a change of 3 percent.Likewise, the Moon's distance from Earth can vary from a minimum of 221,500 miles (356,000 km) to a maximum of 252,700 miles (407,000 km). And that's a whopping change of 14 percent.The result of combining these numbers is that while the Moon's true size doesn't actually change, its apparent diameter — that is, the disk that we see — can range from 7 percent larger than the Sun to 10 percent smaller than the Sun.So, let's think about the two extremes. In one case, Earth is at its closest point to the Sun while the Moon is as far away from Earth as it can get. In other words, the Sun would appear large while the Moon looked small. In this case, there would be no totality at all. Even if the Sun, the Moon, and Earth were in a straight line, people along the path would experience an annular eclipse. The other extreme is much more to our liking. In this case, Earth is at its farthest point from the Sun and the Moon is at its closest approach to Earth. So, our daytime star would look small while our lone natural satellite would look as big as it can get. This is the combination that yields a solar eclipse totality lasting 7½ minutes.So, the actual length of any total solar eclipse's totality lasts somewhere between a fraction of a second and 7½ minutes.Lengths Of Totality For 2024 Solar EclipseTo complicate matters, the length of totality also changes along each eclipse's path, mainly because we live on a round Earth. To help you plot a possible viewing location, here are the durations of totality for a number of cities along the path of the 2024 total solar eclipse. Because the eclipse moves from southwest to northeast, that's the way I've organized the locations. Also, for large cities, the length is an average. Parts of the metro areas closer to the eclipse's center line will have longer durations, and those farther from it will have shorter ones. Knowing exactly how long totality for the 2024 total solar eclipse will be in your neck of the woods will help you prepare for the best possible viewing experience. But no matter how long totality lasts in your location, trust us, it will still feel like a blink of an eye!Do you have a question about the eclipse? Join us live April 1. Share — copy and redistribute the material in any medium or format for any purpose, even commercially. Adapt — remix, transform, and build upon the material. How to Achieve Your Vision — In the tapestry of life, where dreams and aspirations intertwine, the ability to manifest your vision holds the key to unlocking your true potential. Embark on a journey of self-discovery and transformation as we delve into the intricacies of vision achievement, empowering you with practical strategies and inspiring stories to turn your... Read More »In the pursuit of excellence, the path to achieving your personal best is an exhilarating journey of self-discovery, growth, and unwavering determination. Embarking on this transformative adventure requires a blend of strategic planning, unwavering resilience, and an unwavering commitment to continuous improvement. Unveiling the secrets to unlocking your full potential, this comprehensive guide delves into the intricacies of... Read More »In the tapestry of life, our dreams serve as vibrant threads, weaving together our aspirations and propelling us towards a fulfilling existence. 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Read More » Depending on where people wishing to see the upcoming total solar eclipse go in the U.S., the period of totality will last between two and four and a half minutes, according to NASA calculations.The total solar eclipse—when the Sun is completely blocked by the moon—is set to occur on April 8 and will pass from northern Mexico across the Midwest and up into New England. It will be visible in 13 U.S. states as well as small areas of Tennessee and Michigan.As with the last time such an event happened in the U.S., in 2017, many are expected to travel to ideal viewing spots, which has raised concerns about stretched public safety resources. The Federal Highway Administration says that while around 32 million people live in the path of the total eclipse, between 1 million and 5 million are expected to travel there to see it.Because an eclipse is caused by the moon moving across the sun, in many places where this convergence will be visible there will be a partial eclipse—when the moon partially blocks the sun, giving it a crescent shape—for potentially around an hour and 40 minutes. A map indicates the expected path of the total solar eclipse (shaded black) on April 8. The inset shows the last total eclipse in the U.S., as seen at Wyoming's Grand Teton National Park, on... A map indicates the expected path of the total solar eclipse (shaded black) on April 8. The inset shows the last total eclipse in the U.S., as seen at Wyoming's Grand Teton National Park, on August 20, 2017. Each orange band shows how long the total eclipse is expected to be visible, with the innermost band indicating where it will last for six minutes and the outermost where it will last two minutes. GEORGE FLOEY/NASA/Getty But the period in which the moon will totally obscure the sun will be shorter, as the two celestial bodies have to line up perfectly for it to occur. Just before the total eclipse occurs, what is known as "Baily's Beads" will be visible, when sunlight shines through the moon's valleys along its horizon. The eclipse will then enter the "diamond ring" phase, when only a single bright spot is visible along the halo.Generally, areas closer to the center of the path of totality will see the eclipse longer, and those in the South are more likely to have a four-minute totality, NASA says. In the Northeast, the totality is expected to last no more than three minutes, NASA says.Where Will Total Eclipse Last Longest? According to NASA figures, places such as Idabel, Oklahoma, Poplar Bluff, Missouri, and Dallas are expected to see the totality for around four minutes. The totality will begin at 1:40 p.m. CT (2:40 p.m. ET) in Dallas, 1:45 p.m. in Idabel and 1:56 p.m. in Poplar Bluff.Carbonade, Illinois, is not as well as Cleveland and Erie, Pennsylvania, are anticipated to see the totality for around three minutes. Carbonade's total eclipse will begin at 1:59 p.m. CT, Cleveland's at 3:13 p.m. ET and Erie's at 3:16 p.m. Overall, Texas and Arkansas will have the largest areas within the path of totality, and the total eclipse will be visible for the longest there. It is not anticipated to be visible for more than four minutes farther northeast than the outskirts of Lynn, Indiana.In many rural areas, the total eclipse will be visible, but smaller country roads could become overwhelmed by an influx of traffic.Where Will the Total Eclipse Be Shortest?As a general rule, the farther northeast along the path of totality, the shorter the total eclipse is likely to last. From Ohio to Maine, it is expected to last, at most, around three minutes, though some areas near the edge of the path of totality will see it for only one or two minutes.In Burlington, Vermont, and Lancaster, New Hampshire, the total eclipse will last for approximately three minutes, while in Syracuse, New York, and Caribou, Maine, it will be visible for only around two minutes.Why Is a Total Solar Eclipse So Special?For the moon to completely block the sun, the two celestial bodies have to center on a very precise way that occurs only once every 345 years and is only visible across a certain part of the Earth. Eclipses occur because the sun is about 400 times larger than the moon but is around 400 times farther away from Earth, which makes them look the same size in the sky. 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