



ANNULAR SOLAR ECLIPSE

June 10, 2021



Teachers! Make sure to check the slide notes. They have a lot of info for you!

TOPICS

- The Earth, Moon, and Sun system
- Phases of the Moon
- Solar Eclipses
- Eclipse demo
- June 10, 2021 Annular Eclipse

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**THE EARTH, THE MOON,
AND THE SUN**

WHAT DO YOU THINK?

How would you describe the Earth, the Moon, and the Sun on their own? What about together as a **system**?

Consider:

- How do you interact with each every day or night?
- When or why do you notice these interactions?
- Does the interaction of any TWO have noticeable effects?
- Does the interaction of ALL THREE have any noticeable effects?

THE EARTH AND THE MOON

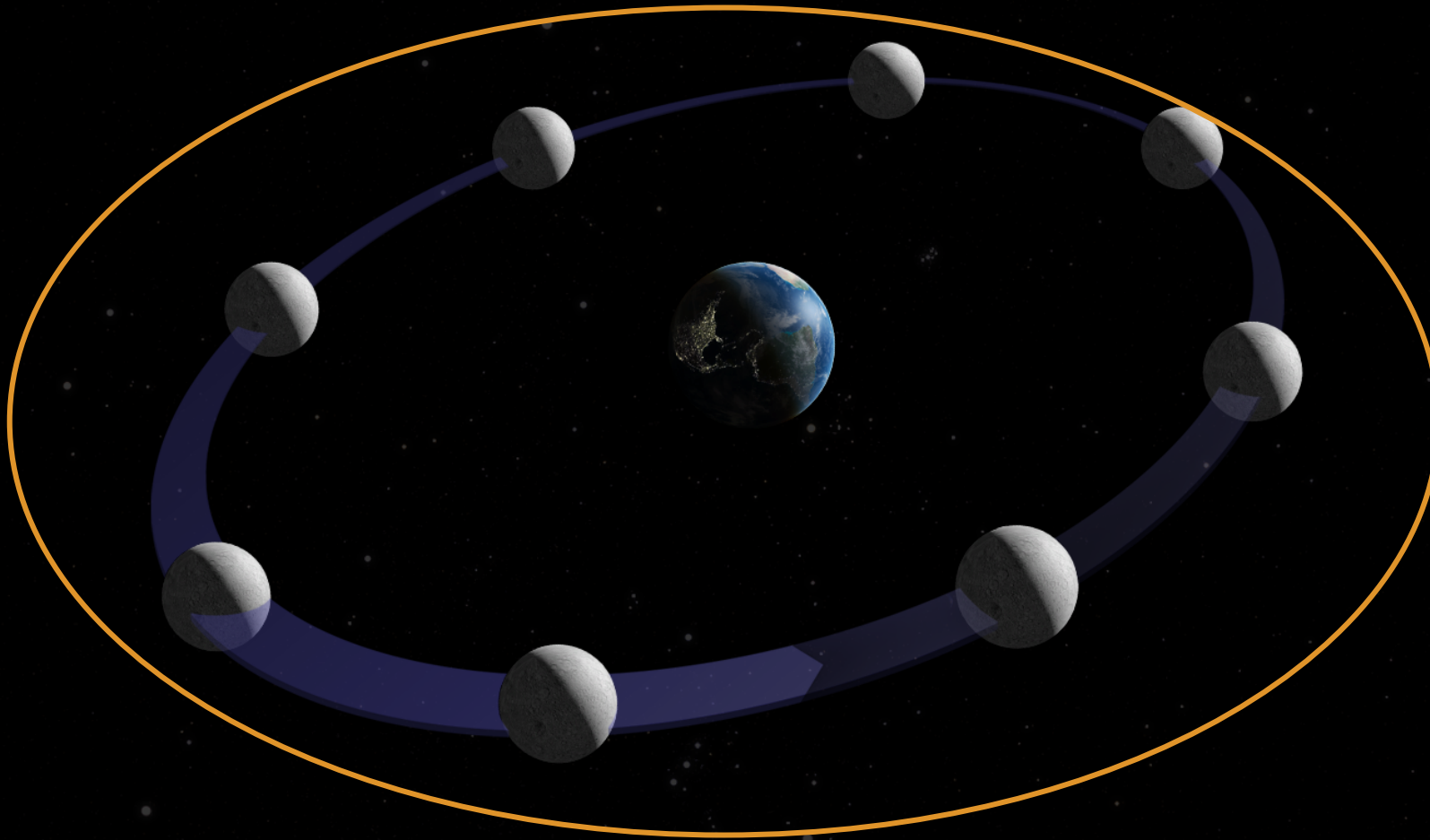
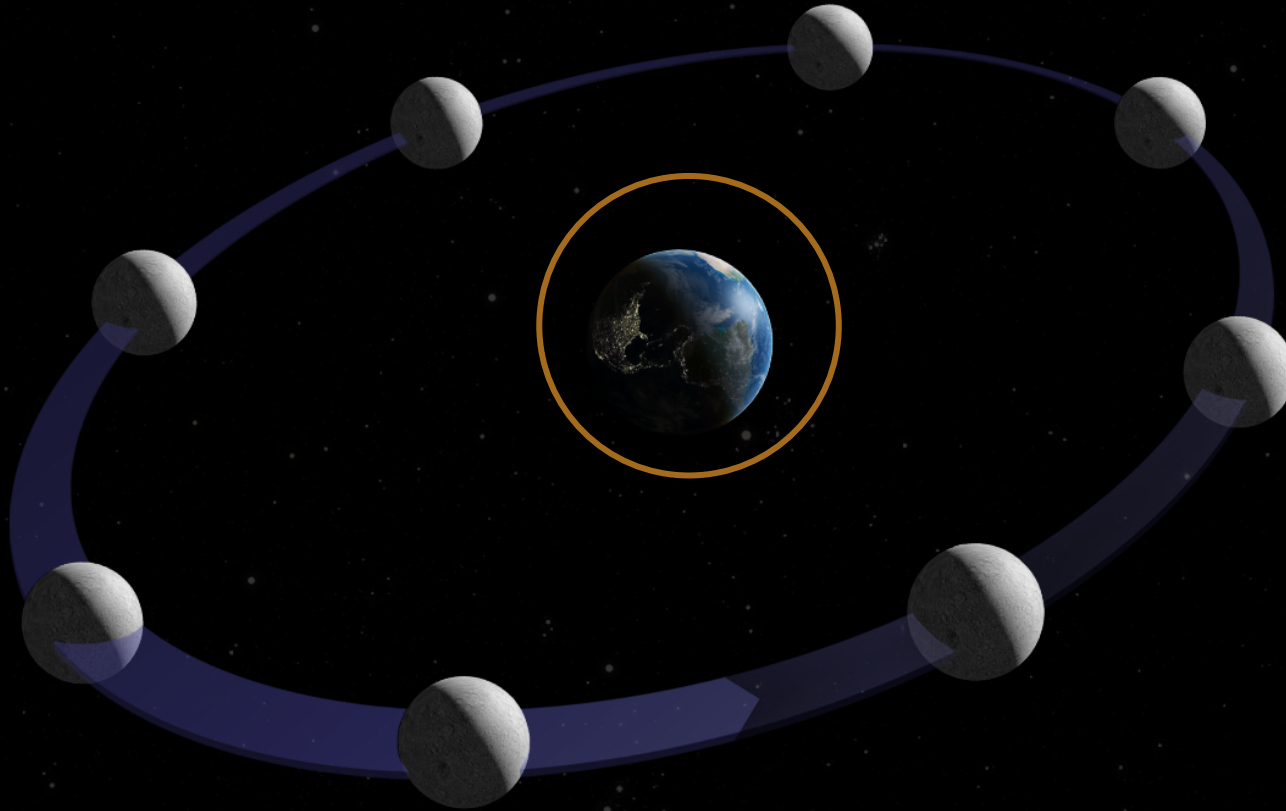
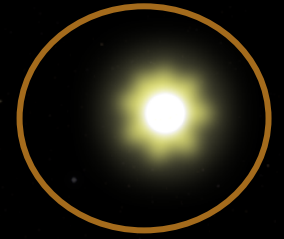


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THE EARTH AND THE SUN



THE EARTH, THE MOON, AND THE SUN

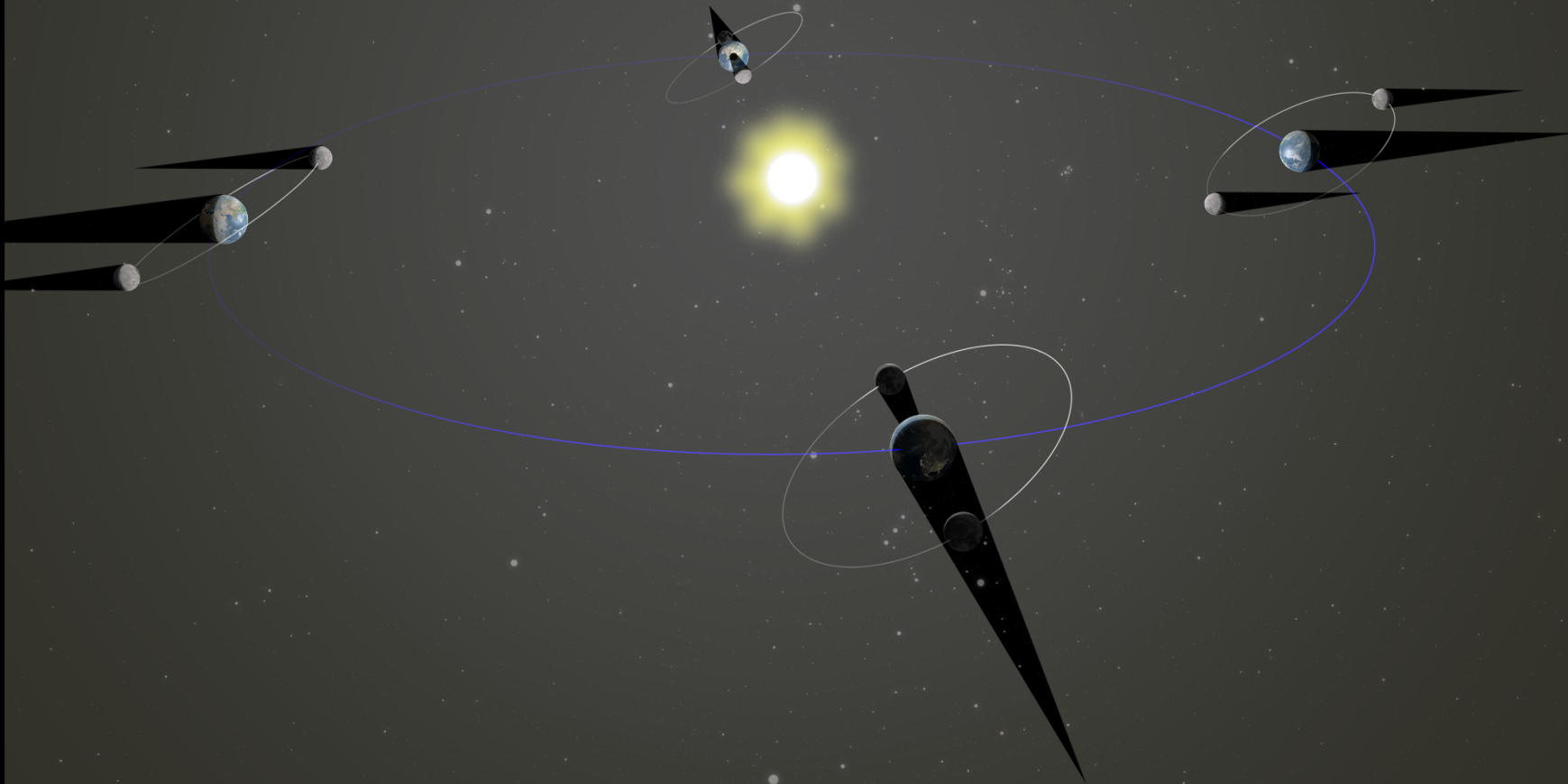


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PHASES OF THE MOON

WHAT DO YOU THINK?

Knowing that the Moon, Earth, and Sun are in a system with complex outcomes, what might some of these outcomes be?

Considering the phases of the Moon, discuss:

- Are the phases of the Moon an interaction between the Sun, the Moon, and the Earth OR only an interaction between the Sun and the Moon?
- Why or why not?

PHASES OF THE MOON

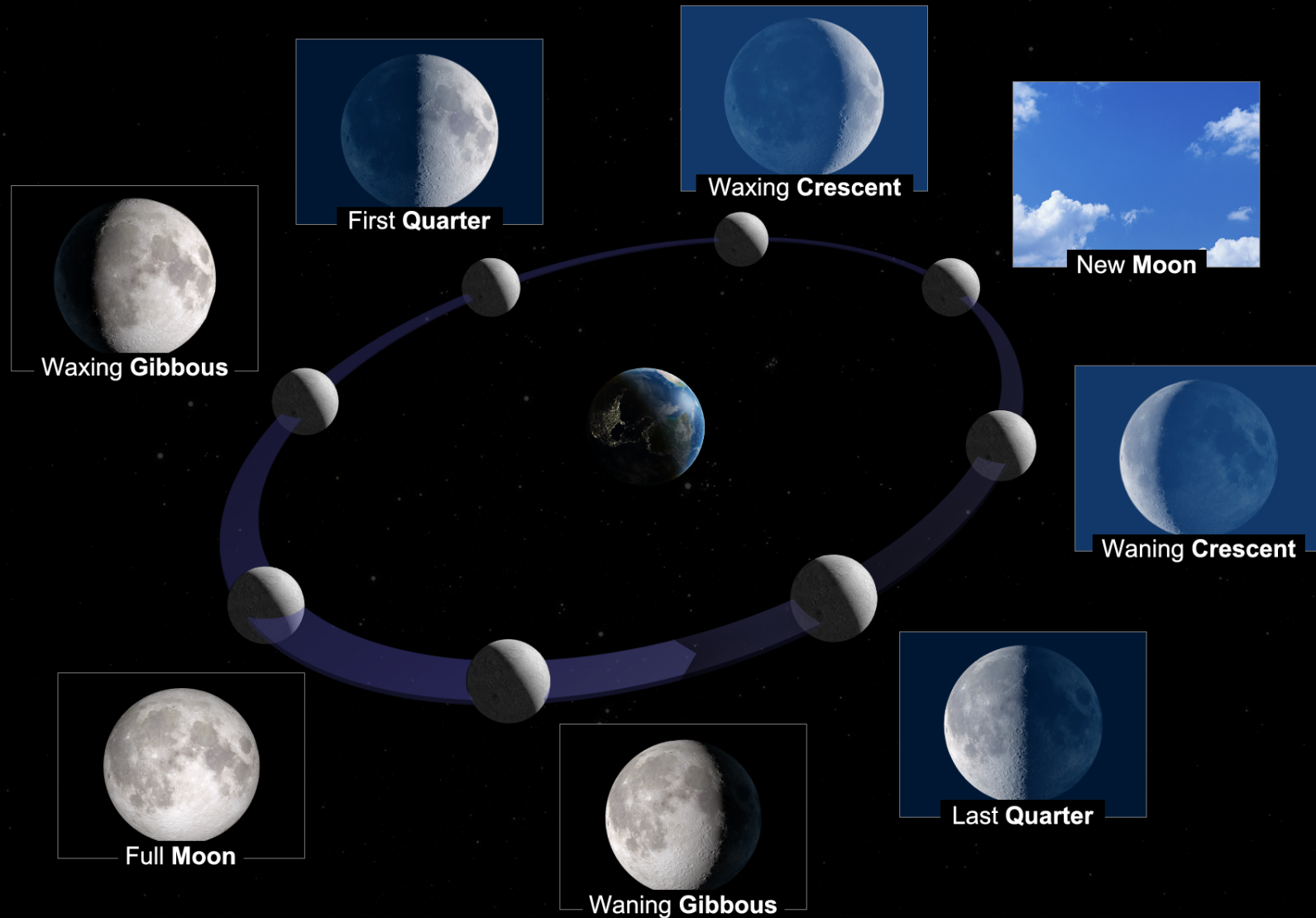
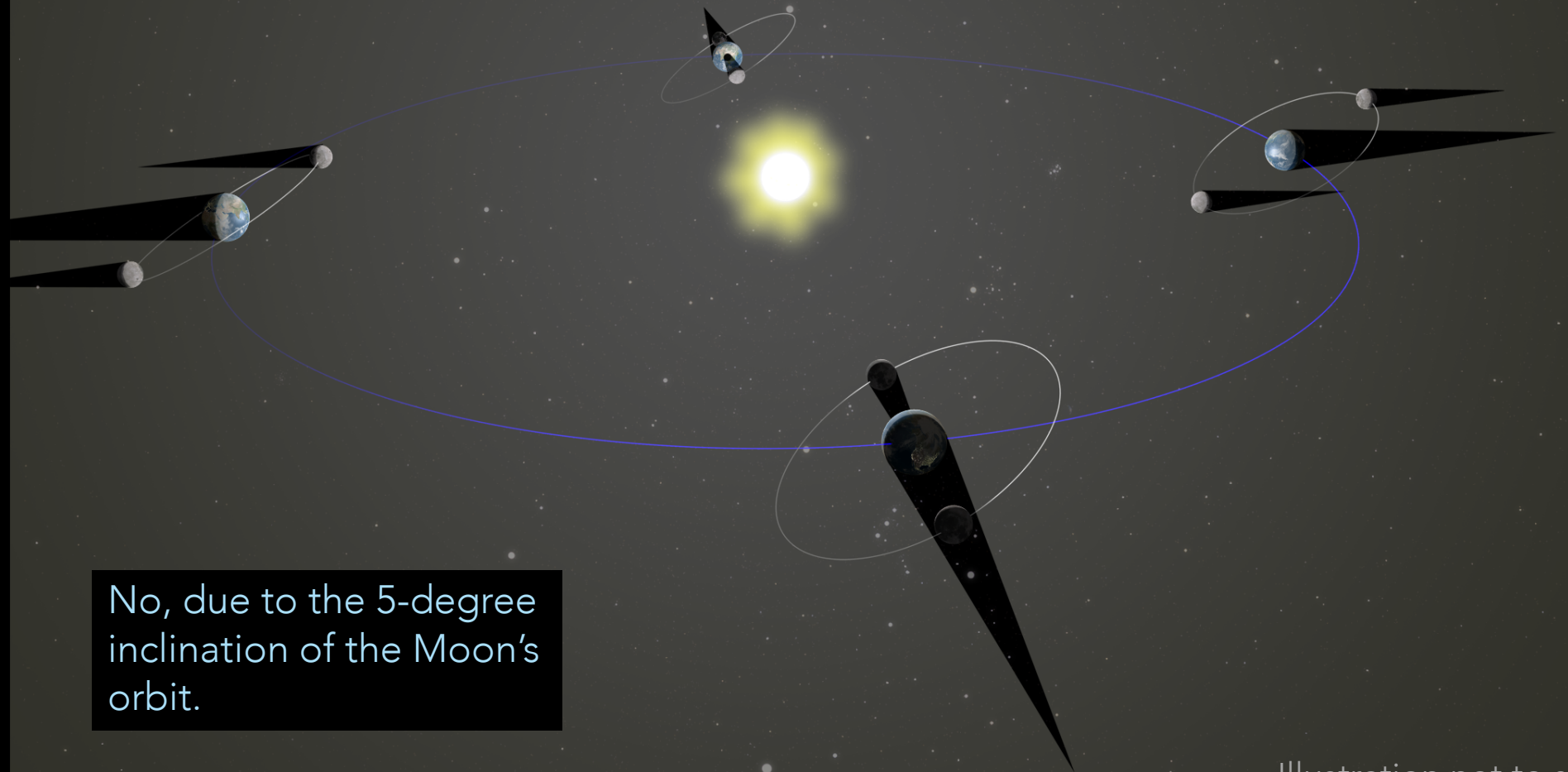


Illustration not to scale

ARE FULL MOON AND NEW MOON ECLIPSES?



No, due to the 5-degree inclination of the Moon's orbit.

Illustration not to scale

WHAT DO YOU THINK?

Now that you know more about the phases of the Moon, would you change your answer to the question posted at the beginning?

- Are the phases of the Moon an interaction between the Sun, the Moon, and the Earth OR only an interaction between the Sun and the Moon?
- Why or why not?

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SOLAR ECLIPSES

WHAT DO YOU THINK?

How would you define a solar eclipse? Can you draw a diagram of what happens during a solar eclipse in the Earth, Moon, and Sun system?

Consider:

- Is there more than one type of solar eclipse? How many are there?
- How often do solar eclipses happen?

SOLAR ECLIPSE

Solar eclipse (eclipse of the Sun) : the Moon's shadow falls on the Earth

→ we look at the Sun and the Moon covers it



© Thomas Collin

A **solar eclipse** happens when the Moon passes between the Earth and the Sun (at new Moon)..

If the alignment is perfect, the shadow of the Moon will fall on the surface of the Earth.

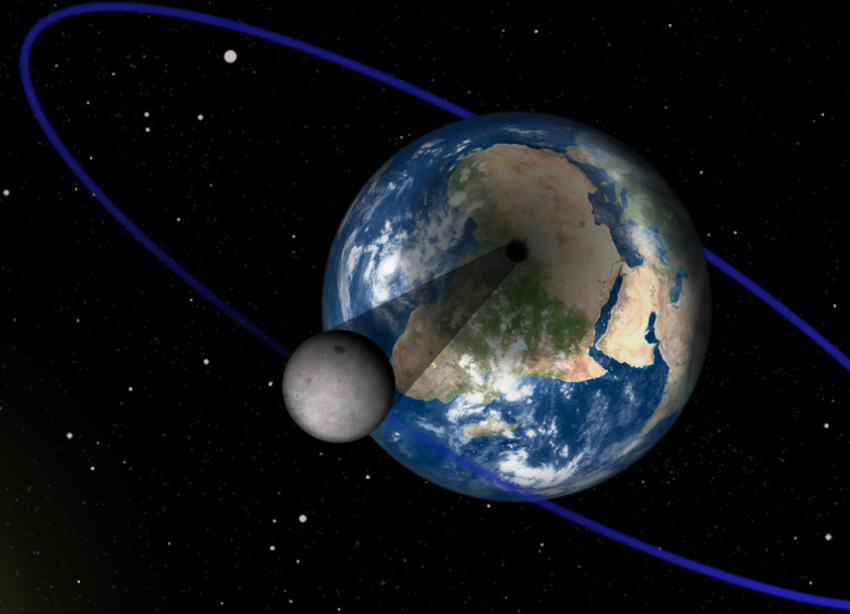
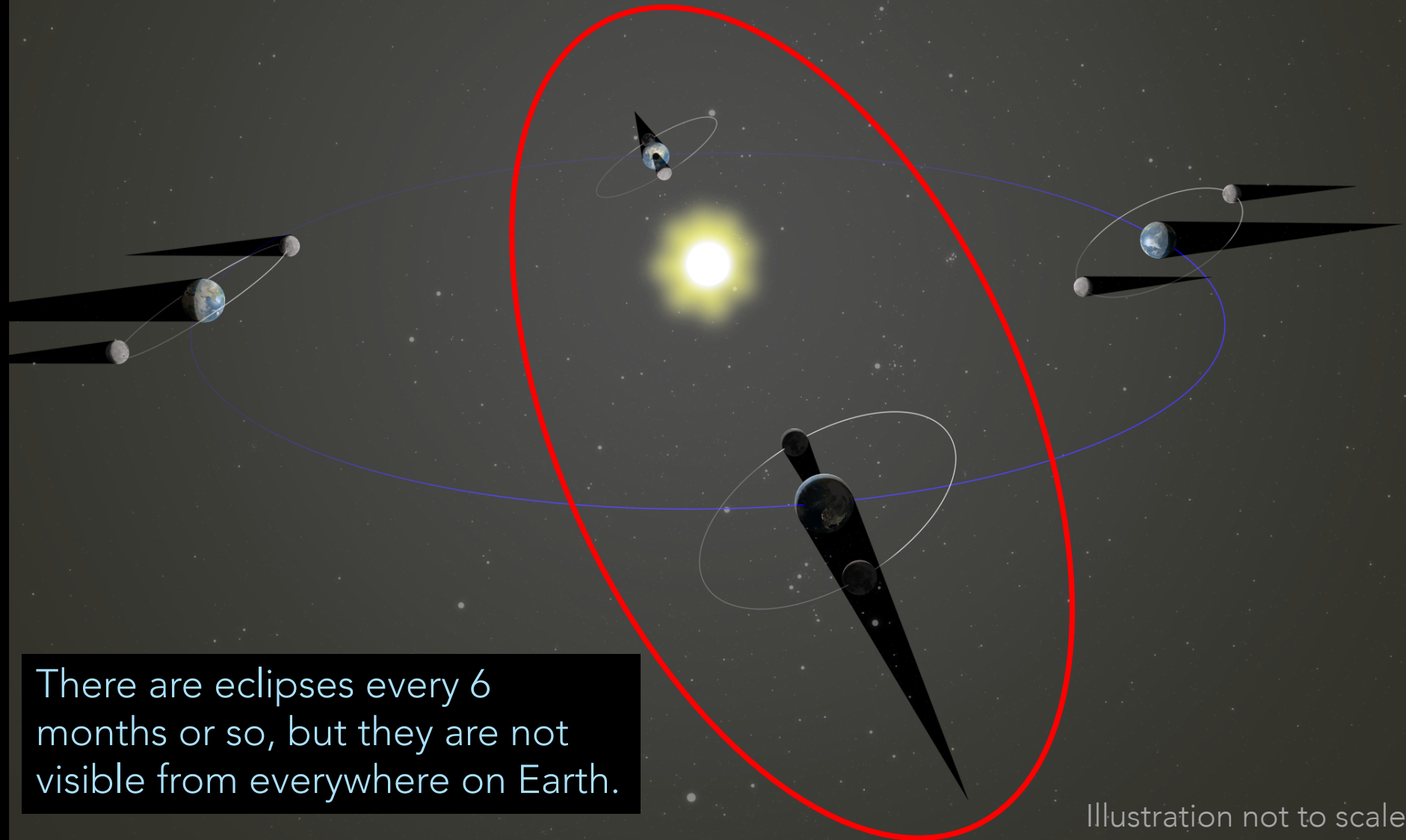


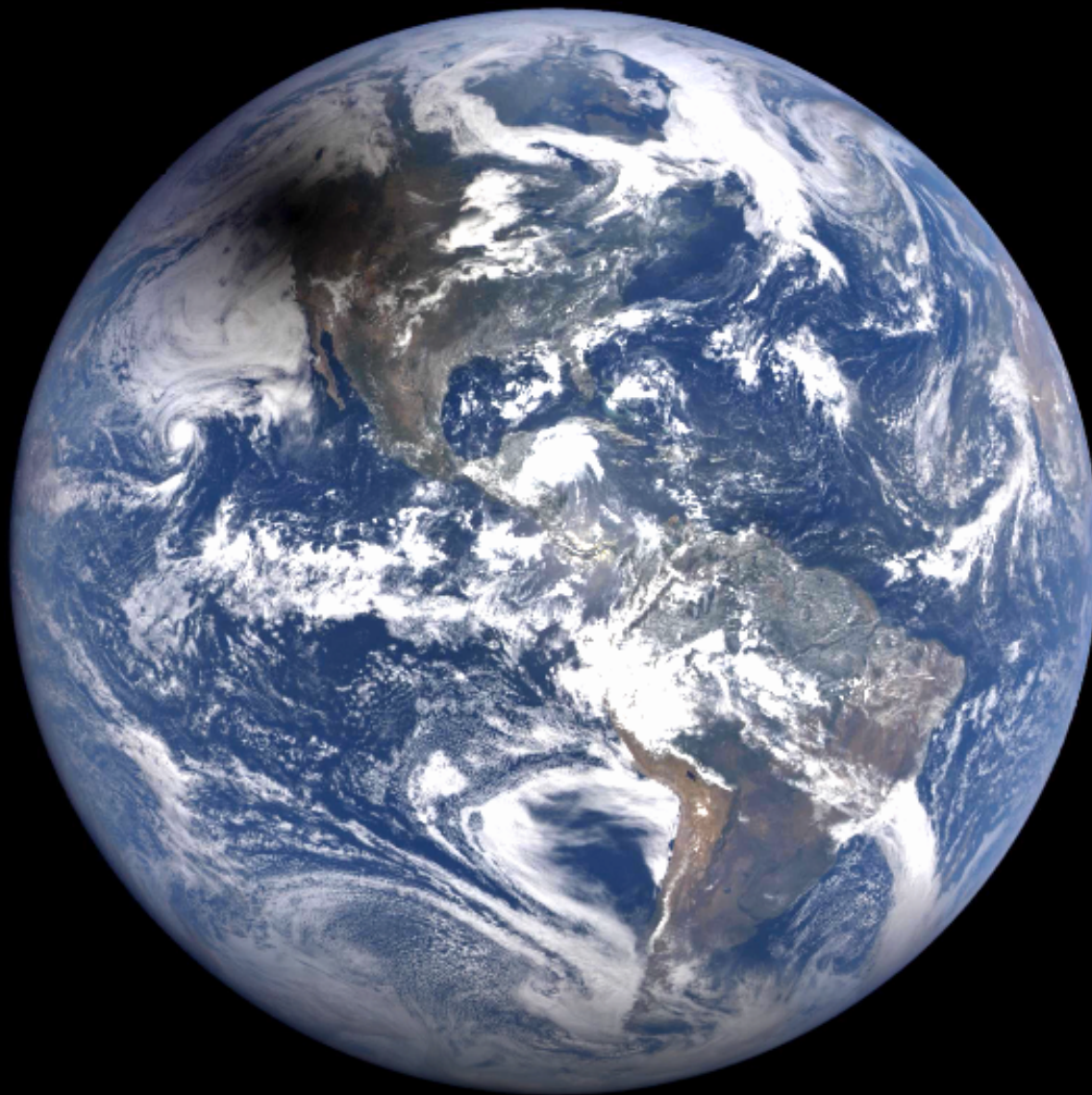
Illustration not to scale

FREQUENCY OF SOLAR ECLIPSES



There are eclipses every 6 months or so, but they are not visible from everywhere on Earth.

Illustration not to scale



Solar eclipse of August 21,
2017 by DSCOVR - EPIC

https://epic.gsfc.nasa.gov/galleries/2017/total_solar_eclipse/video

AS SEEN FROM EARTH:

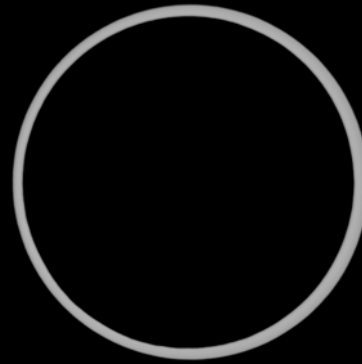


THREE TYPES OF SOLAR ECLIPSES



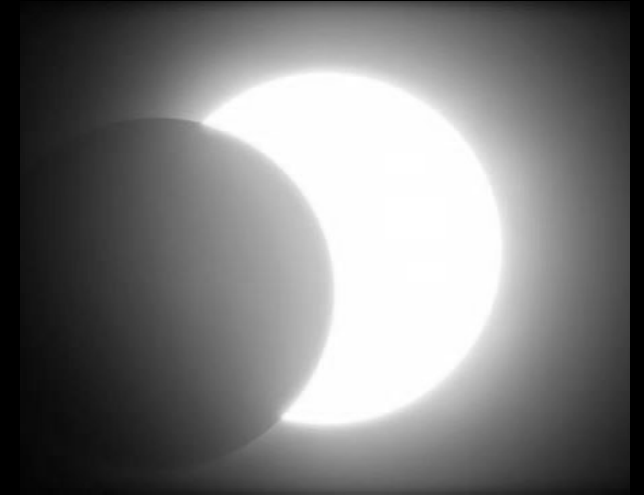
Total eclipse

- when the Moon blocks the Sun completely



Annular eclipse

- when the Moon is in front of the Sun but appears smaller than the Sun



Partial eclipse

- when the Moon is not completely in front of the Sun

WHAT DO YOU THINK?

We know that there are 3 types of solar eclipse: **partial**, **annular**, and **total**.

Using words and diagrams, explain the difference between each type.

Consider:

- What must be true for all types of solar eclipse? How are they the same?
- What could be different between the three types of solar eclipse, given what you know about the Earth, Moon, and Sun system?

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ECLIPSE ACTIVITY DEMONSTRATION

METHOD

- ★ Hold the ruler in the sunlight and align the Earth and the Moon to create eclipses, either solar or lunar.
- ★ Careful not to create shadows with your hands!



Since the alignment can be difficult, we can use the shadows of both balls on the ground. They should be right on top of one another to create an eclipse.

OBSERVATIONS – SOLAR ECLIPSE

Shadow of the Moon



OBSERVATIONS: LUNAR ECLIPSE

Lit Moon



Eclipsed Moon



ECLIPSE DEMO ACTIVITY

This demo activity is from the Astronomical Society of the Pacific:
<https://myasp.astro.society.org/product/KT110/yardestick-eclipse-activity-set-of-5>

You can see a video they created here:
<https://youtu.be/FVYLHCezJug>



TO CREATE MORE ACTIVITY KITS

- ★ Styrofoam ball - 2.5 cm (Earth)
- ★ Styrofoam ball about 0.7 cm (Moon)
- ★ 2 paper clips
- ★ 1m ruler or stick

On the ruler, put the balls 75cm apart. This now represents the Earth-Moon system to scale.



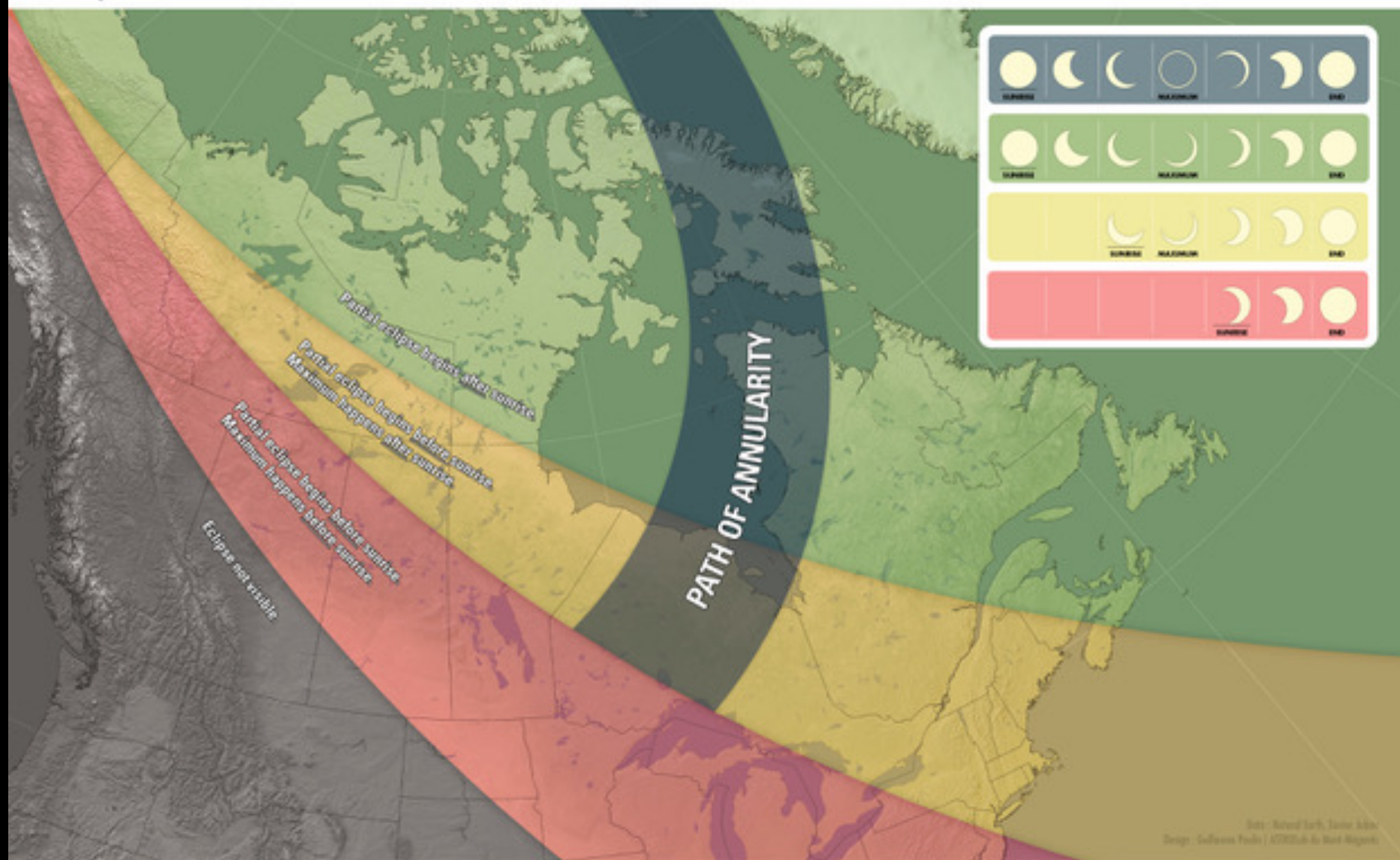
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JUNE 10, 2021 ANNULAR ECLIPSE



ANNULAR SOLAR ECLIPSE

JUNE 10, 2021



WARNING! NEVER LOOK
DIRECTLY AT THE SUN WITHOUT
PROPER EYE PROTECTION.



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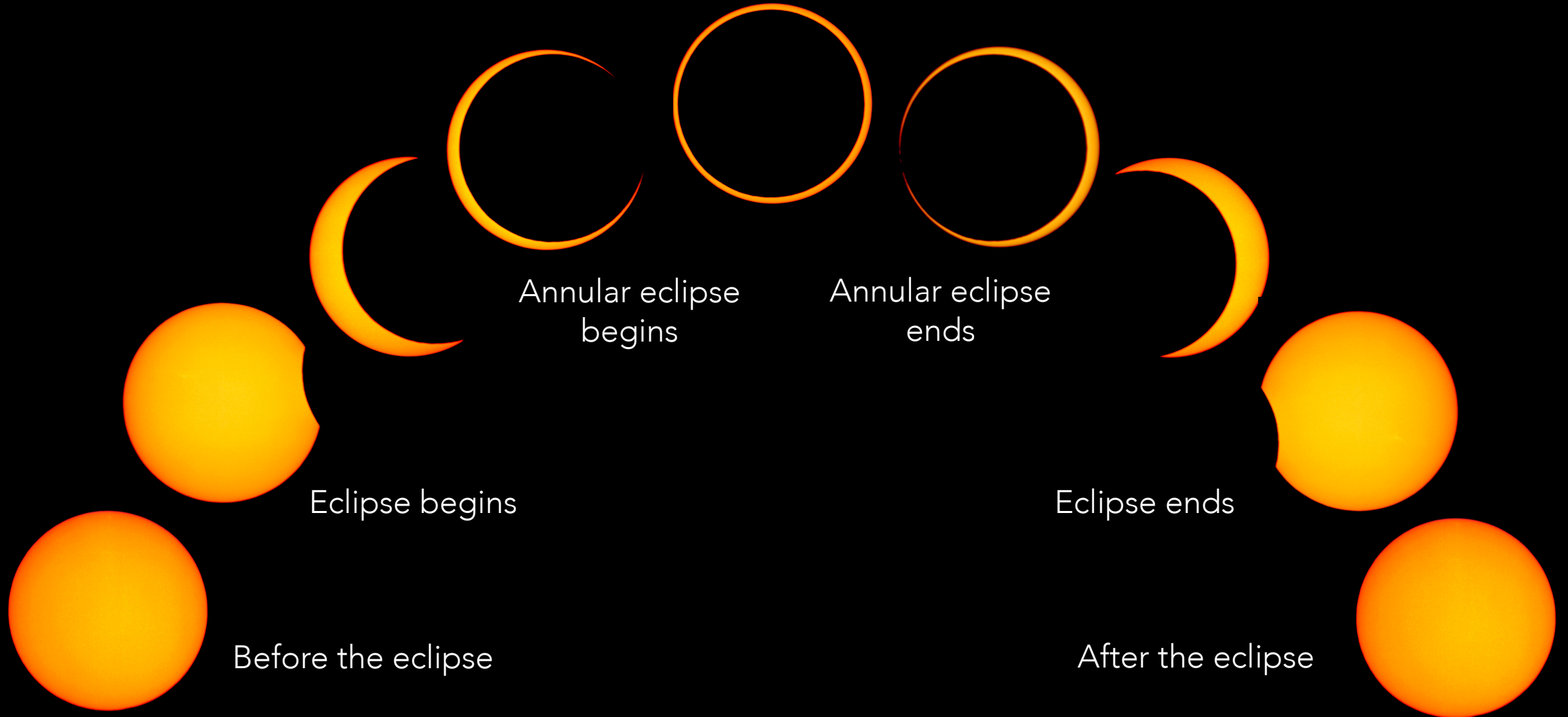
THE LOCAL TIMES FOR THE ECLIPSE ARE:

Where do you live?	Start time of the eclipse	Time of eclipse maximum	End time of the eclipse

Since the eclipse happens very early in the morning, the Sun will still be quite low in the eastern sky. Think of how you can see it from your location, and whether buildings or hills could block the view.

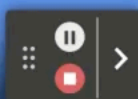
WHAT WILL YOU SEE?

Eclipse maximum (annular)





Partial Eclipse Ends



NEVER LOOK AT THE SUN DIRECTLY WITHOUT PROPER EYE PROTECTION!



WHAT SOLAR ECLIPSES MEAN TO US

UPCOMING ECLIPSES

Depending on your region, there may be a solar eclipse happening again soon. Check out a complete list here of upcoming solar and lunar eclipses:

<https://www.timeanddate.com/eclipse/list.html?region=north-america>

Some upcoming solar eclipses of note for North America include:

- June 10, 2021 (annular solar eclipse)
- October 14, 2023 (annular solar eclipse but partial in Canada)
- April 8, 2024 (total solar eclipse)
- March 29, 2025 (partial solar eclipse)
- August 12, 2026 (total solar eclipse but partial in Canada)

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