



Phases of the Moon



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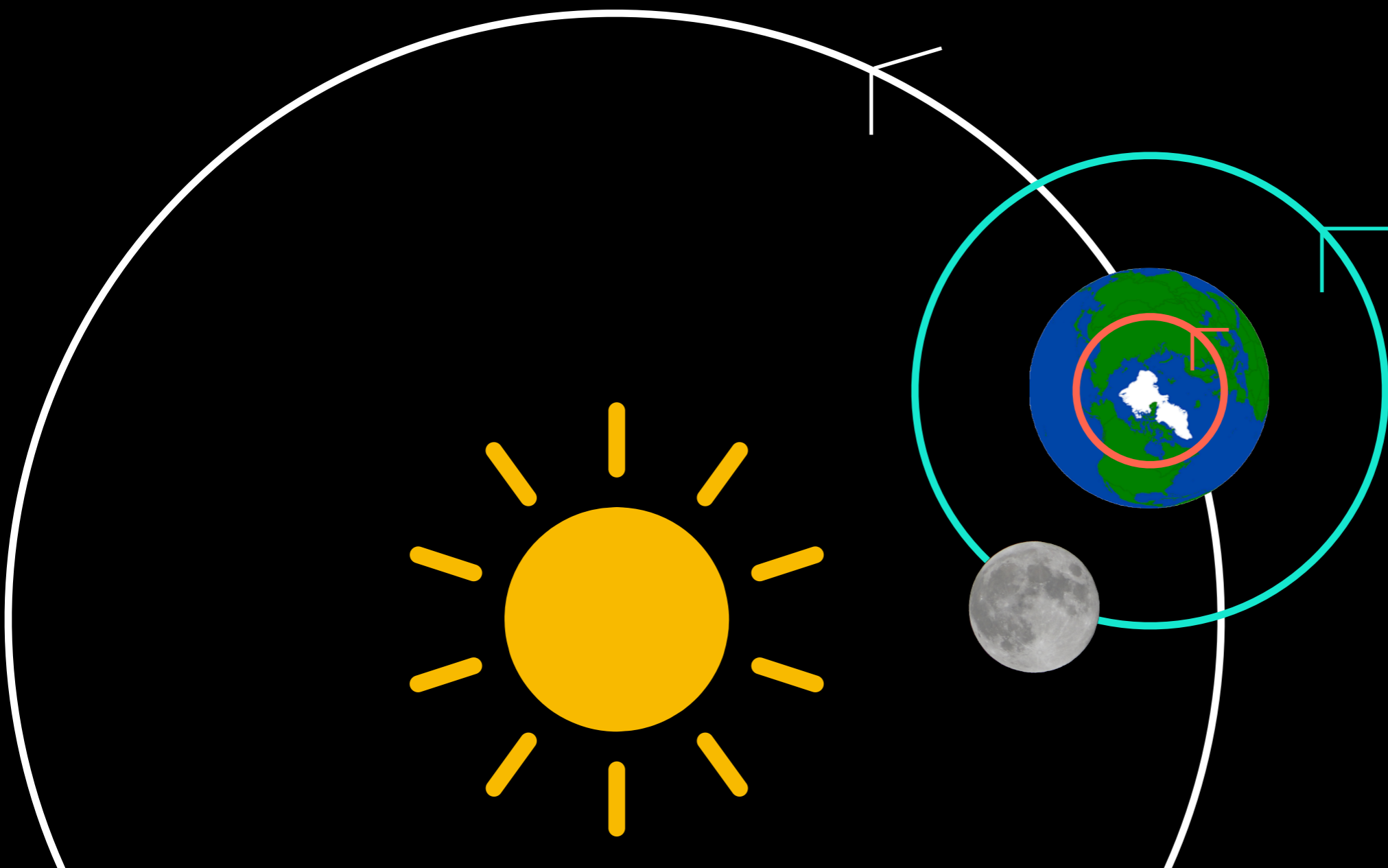
Earth's rotation around the Sun

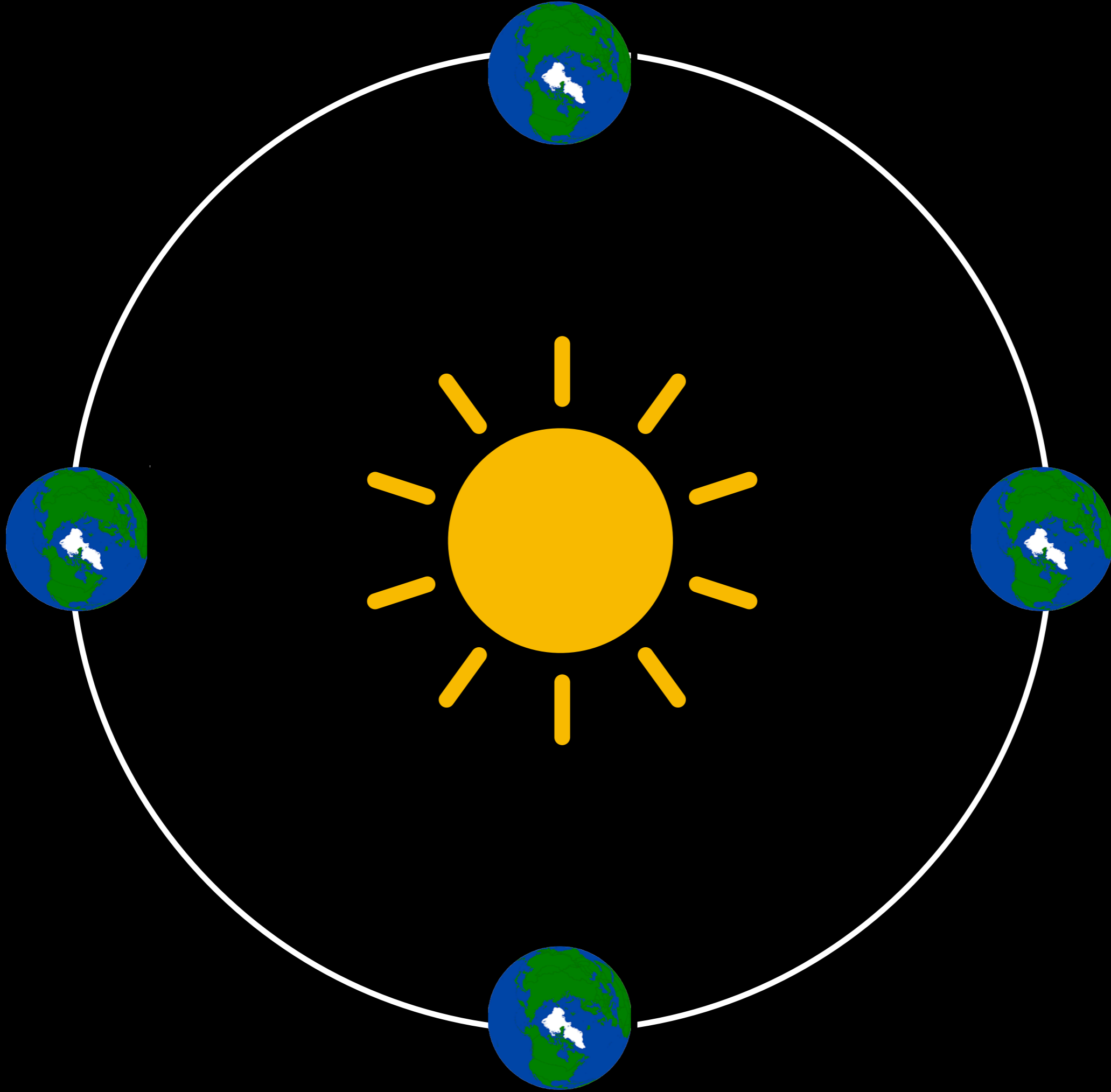
Moon's revolution around the Earth

Earth's rotation about itself

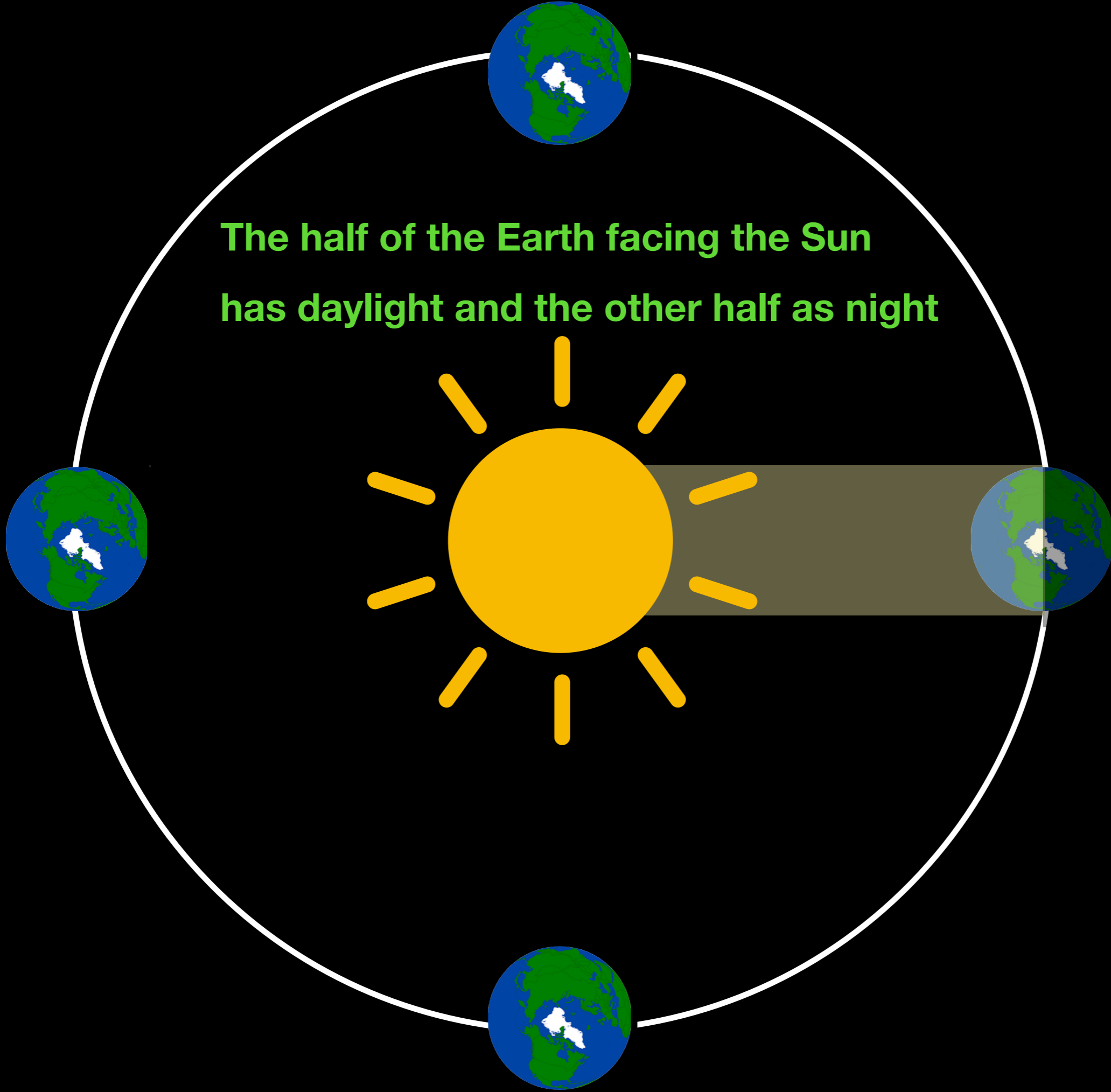
are all West to East

(anti-clockwise as seen from North)

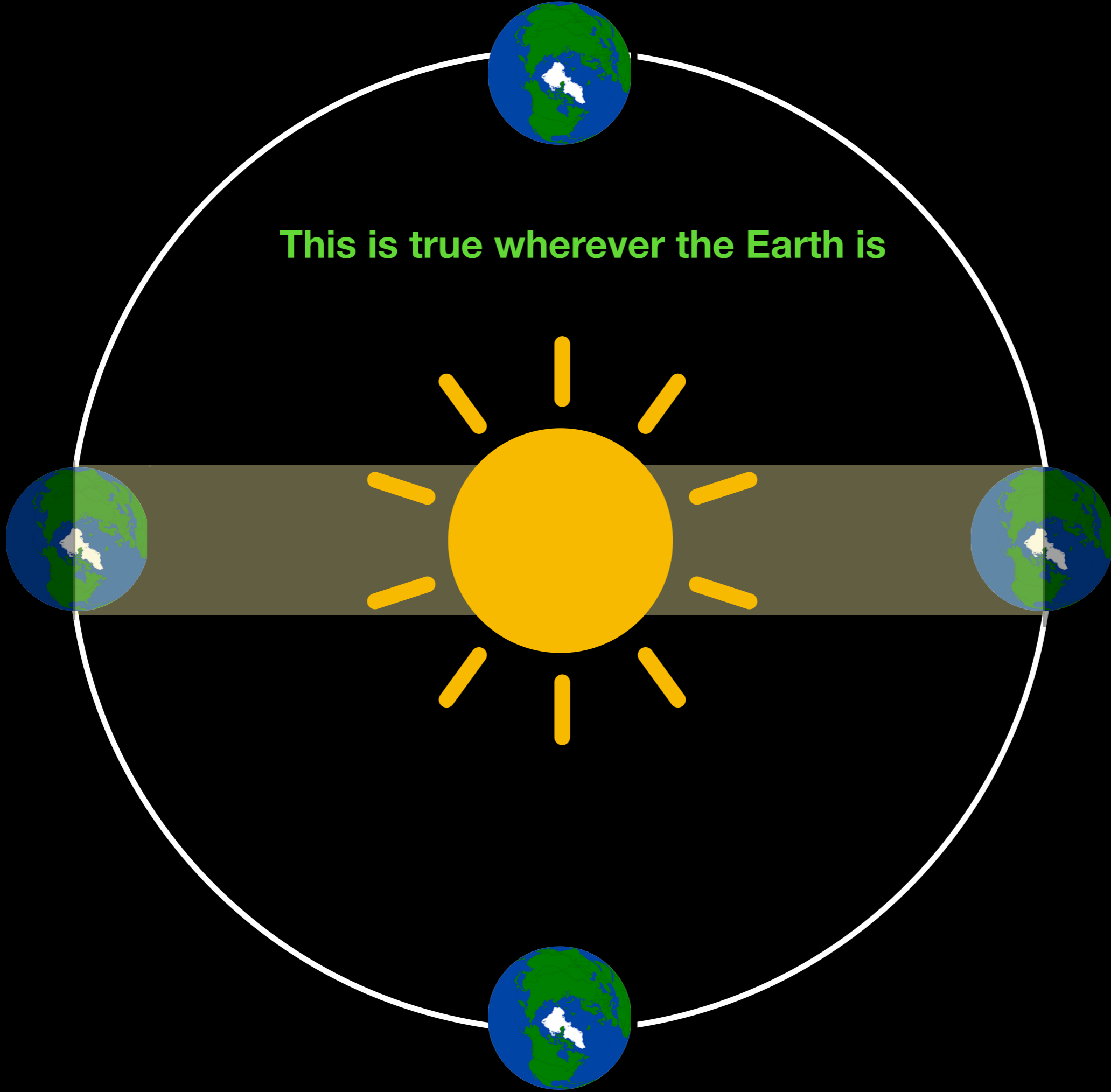


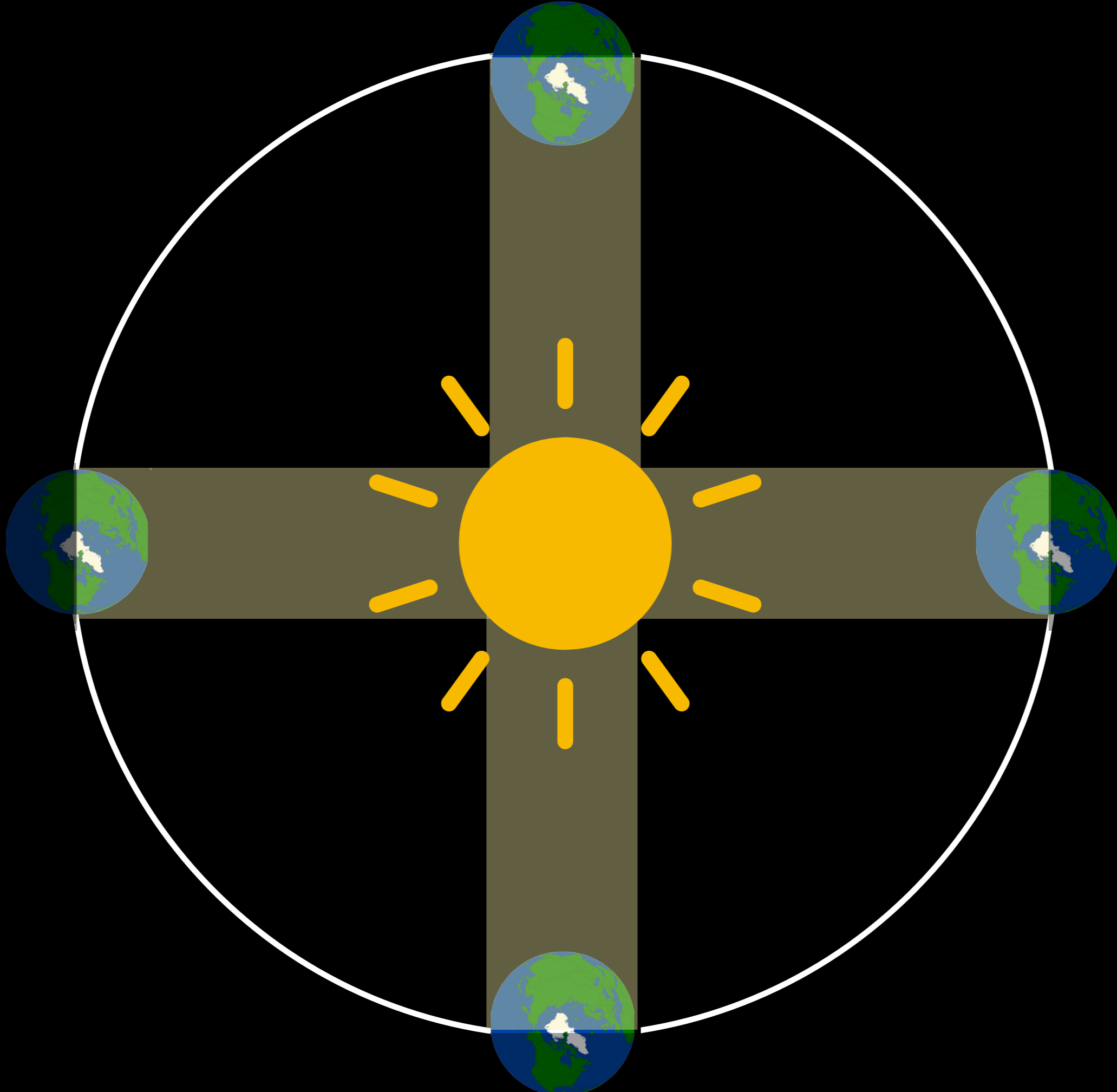


**The half of the Earth facing the Sun
has daylight and the other half as night**

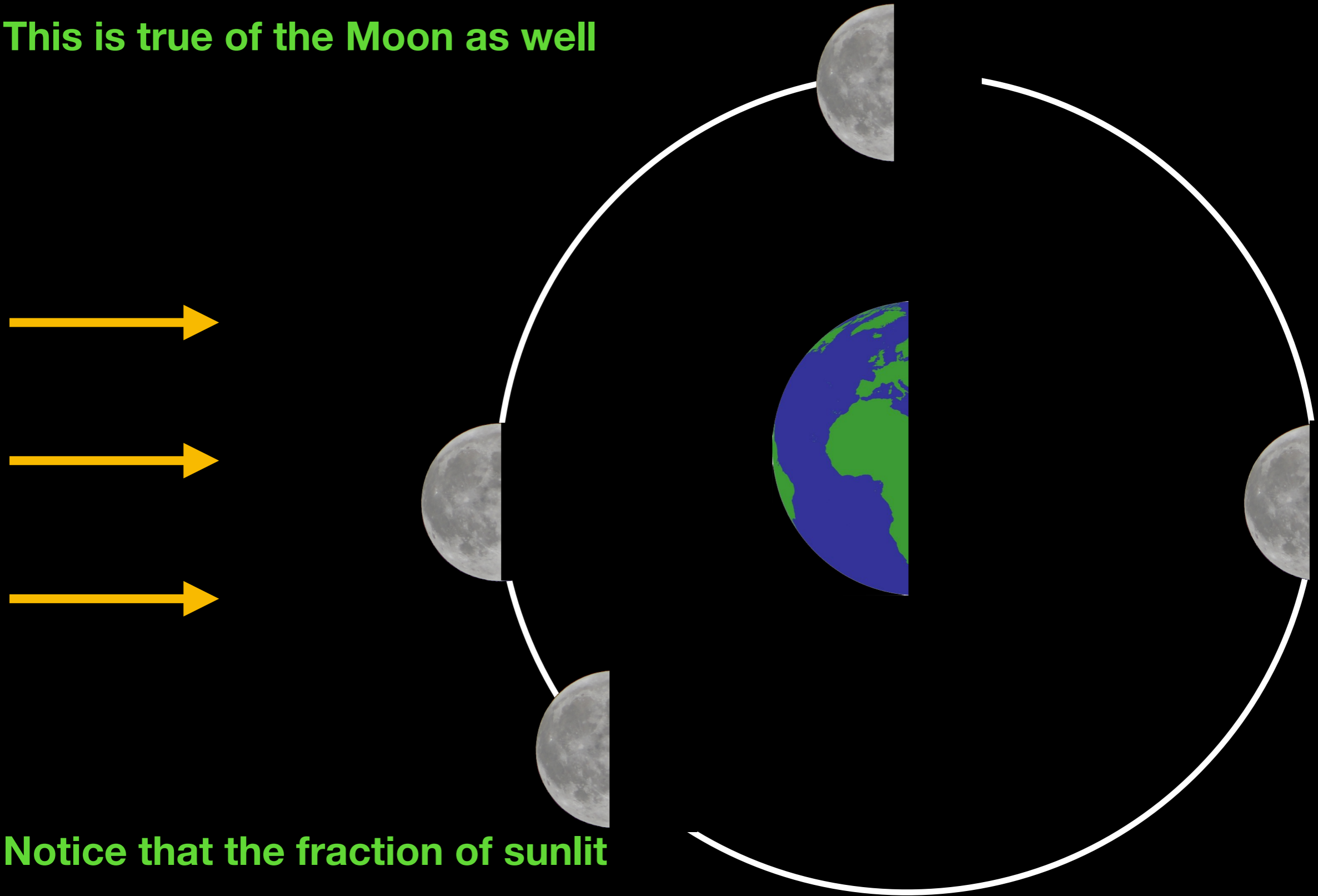


This is true wherever the Earth is





This is true of the Moon as well



**Notice that the fraction of sunlit
Moon that the Earth sees varies**

This is the Earth-Moon system to scale (for distance and for size).

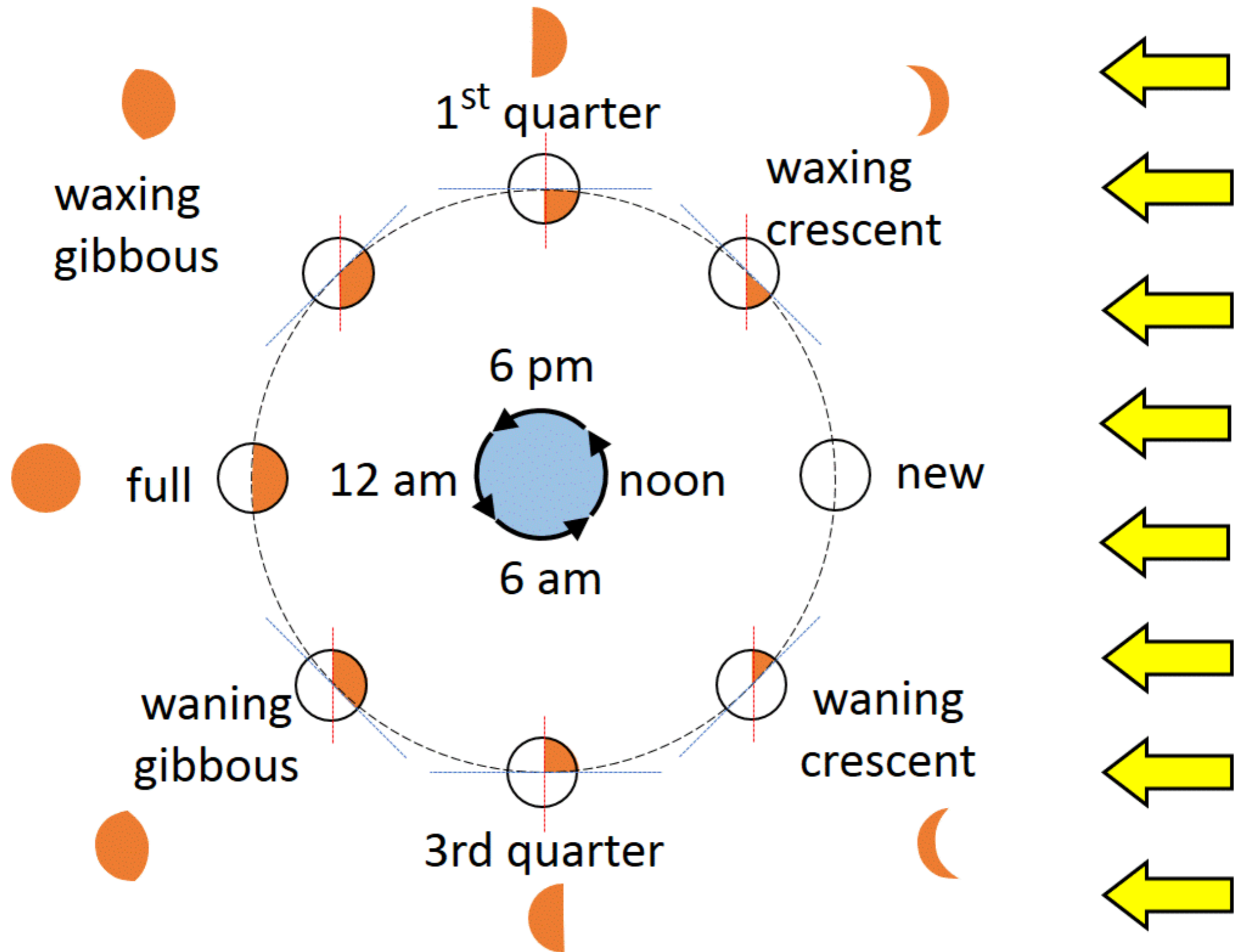
Moon



Hence the Moon will look the same from all parts of the Earth, since it is so far away compared to its size.

Earth

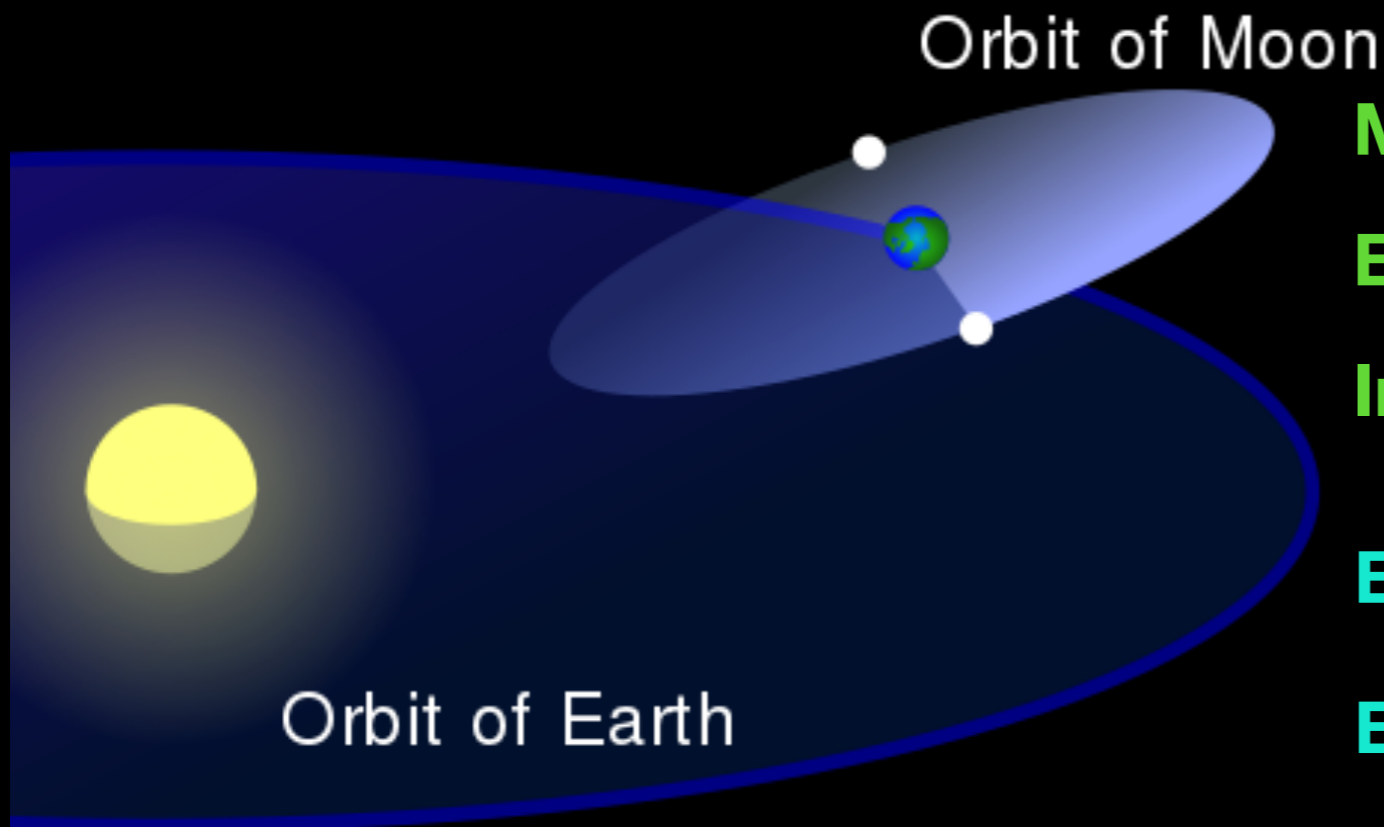




Animation

<https://ccnmtl.github.io/astro-simulations/lunar-phase-simulator/>

- **First, notice when sunrise, noon, sunset and midnight happen on Earth every 24 hours**
- **Notice that the Moon's rotation and revolution period are the same, and presents the same face to us**
- **As Moon rotates, notice when it is seen in daytime versus night time**
- **At New Moon, Moon and Sun rise together, and at Full Moon, 12 hours apart**
- **Notice the phases of the Moon and its waxing and waning**
- **Moon rises 50 mins later each day**
- **Because of the anticlockwise motion of Moon and Earth, we can see the Moon even at sunrise in waning fortnight, and even at sunset in the waxing fortnight**

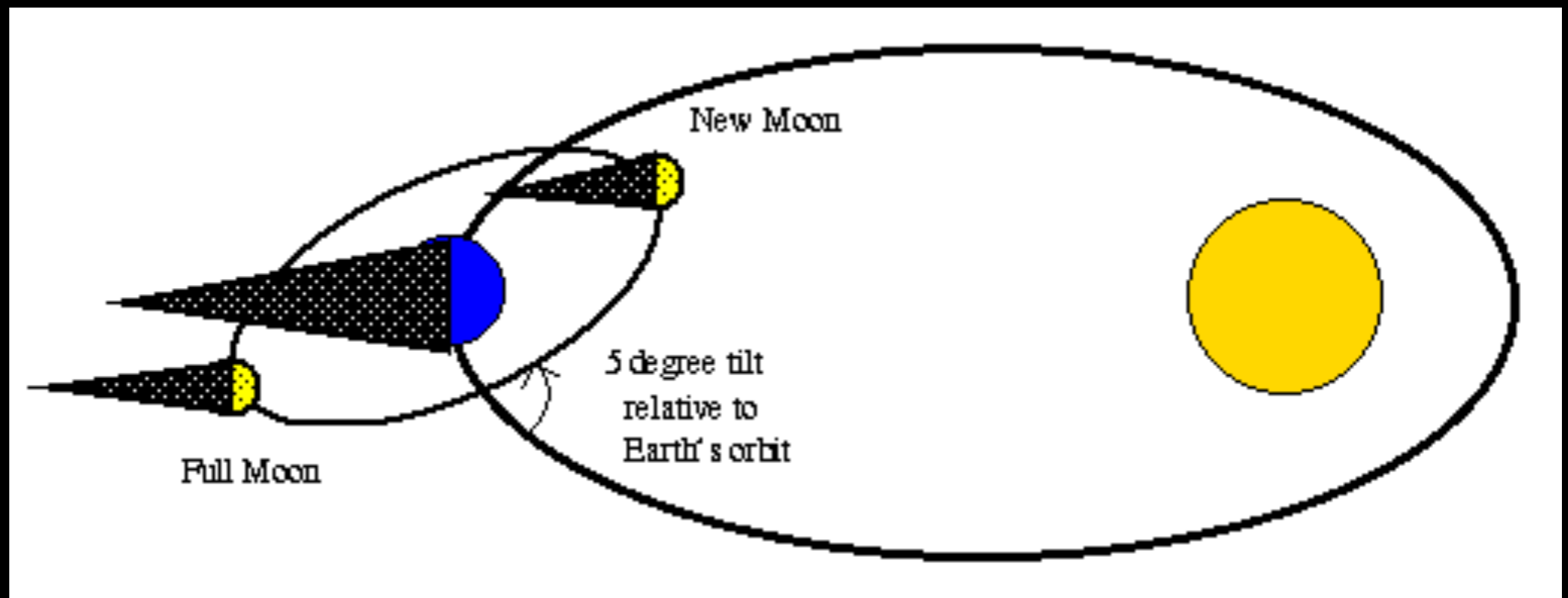


Moon's orbit around the Earth & Earth's orbit around the Sun are Inclined at 5 degrees to each other

Every new moon \neq Solar eclipse

Every full moon \neq Lunar eclipse

Not to Scale!



Credit: Univ of Maryland

Can you see the Moon during daytime?

Yes, you can

How many of you have seen the Moon during daytime?

How does the Moon shine? Where does moonlight come from?

The Moon shines due to light from the Sun. Hence which part of Moon gets sunlight does not depend on the Earth.

Does the Moon also go around the Sun?

Yes, the Moon goes around the Earth, and the Moon and Earth together go around the Sun.

Does the Moon also have day and night like the Earth?

Yes, but a day and night on the Moon last for 15 days each

Is the dark portion of Moon because of the Earth's shadow?

No, it is because that portion is not getting light from the Sun, just like night time on Earth.

Does the Moon rise at the same time every day?

No, it rises roughly 50 minutes later every day

Full moon to full moon takes 29.5 days. What's this got to do with a month?

Yes, this is where the concept of a month comes from.

If the New Moon is when the Moon is in between us and the Sun, why is it not a solar eclipse?

During a New Moon, the Moon and Sun are in the same direction, but the Moon is usually slightly away from the Sun. Very rare New Moons are solar eclipses when the Moon comes exactly in between Sun and Earth.

Will the Moon see phases of the Earth?

Yes, it will, since the Earth also gets its light from the Sun, and the Moon will see different fractions of the sunlit daytime Earth as it goes around us

Can the sunlit part of the Moon be convex, concave and hemispherical at different times?

Yes, depending on the phase

During New Moon, does the Moon not rise at all? Is it below the horizon?

No, it rises and sets at almost the same time as the Sun. Since it presents its dark side, or night side, to us, we can't see it in the sky.

For two weeks after New Moon, is the Moon already in the sky at sunset?

Yes

In the waning fortnight, is the Moon already in the sky at sunrise?

Yes

Can one place on Earth see the New Moon while another place see the Full Moon?

No. Since the size of the Moon is much smaller than its distance from us, all places on Earth will see the same phase of the Moon when it is above the horizon

If the Moon shines due to light from the Earth, will it show phases?

No. In that case, we will always see a Full Moon since the Earth will illuminate the portion of the Moon that we see.

Will the satellites of Jupiter show phases as seen from Jupiter?

Yes. And the satellites will in turn see Jupiter showing phases too.

Will the Earth or the Moon show phases as seen from the Sun?

No, since they shine by sunlight, the Sun will always see Full Moon and Full Earth

Is the Moon visible every night in the evening?

No.



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