Moon Day

The Lunar Calendar

Overview of the Moon

And the physics behind it …

Moon in the Science point of view ..

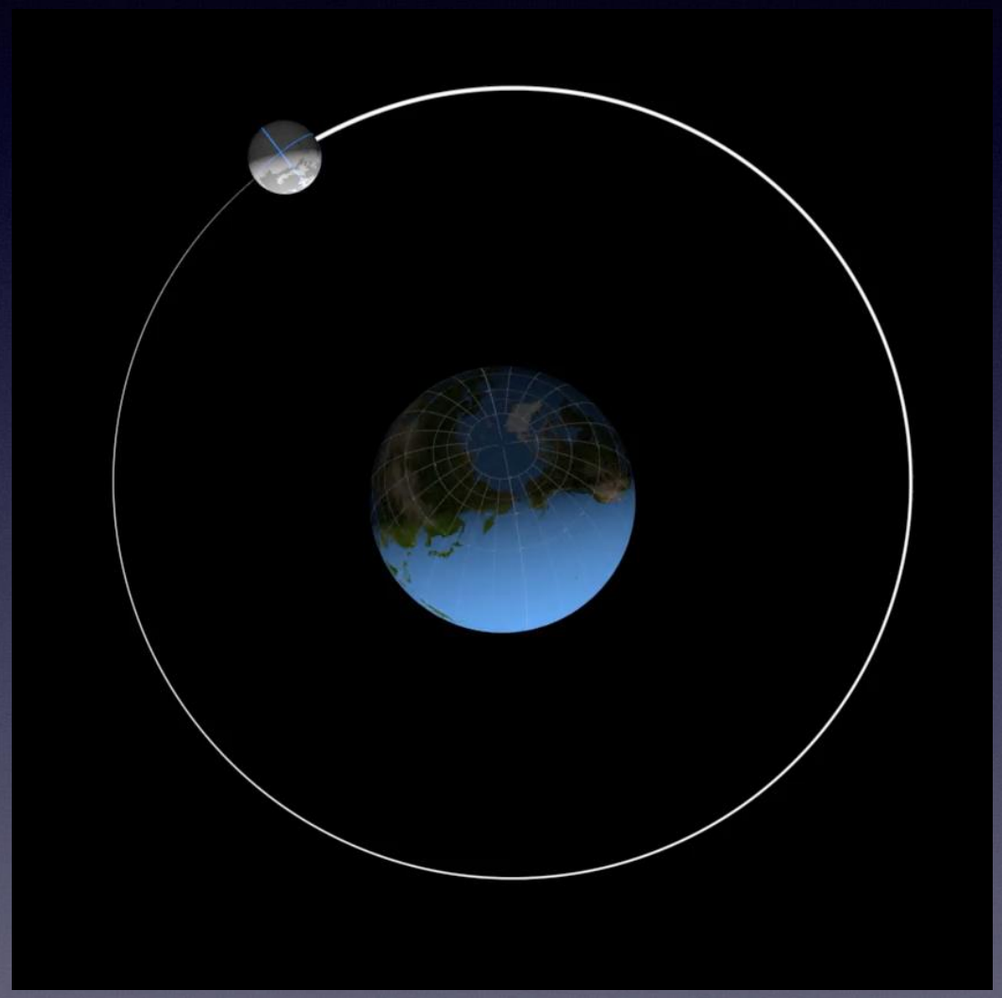
- Simply… our Moon is the natural satellite of Earth, visible by reflection of sunlight and traveling around Earth in a slightly elliptical orbit at an average distance of about 381,600 km (237,000 mi).

Moon in Motion

- Imagine you're in a spaceship, traveling away from Earth. As you sail onward, you see our planet and its Moon locked together in their endless, circling, gravitational embrace. Your distant view gives you a unique perspective on the Moon that can be hard to visualize from the ground, where the Moon appears to sweep through the sky as an ever-changing globe of light.

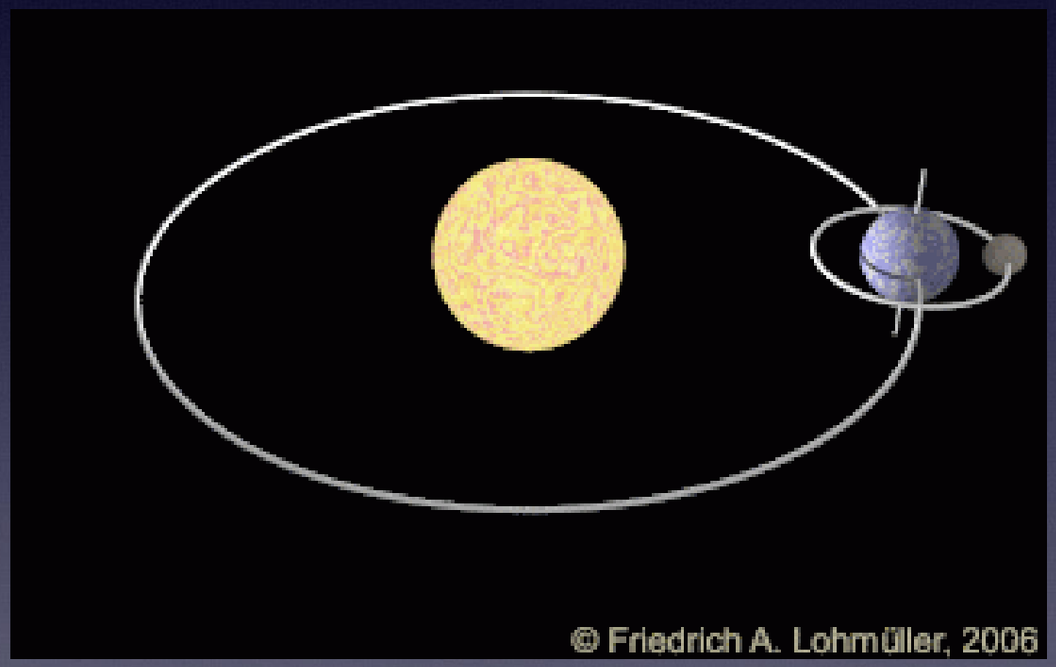
So… Why we only see one face of the Moon?

- From your astronaut's viewpoint, you can see that the Moon is an average of 238,855 miles (384,399 km) from Earth, or about the space that could be occupied by 30 Earths. It travels around our planet once every 27.322 days in an elliptical orbit, an elongated circle. The Moon is tidally locked with Earth, which means that it spins on its axis exactly once each time it orbits our planet. ***Because of this, people on Earth only ever see one side of the Moon. We call this motion synchronous rotation.***

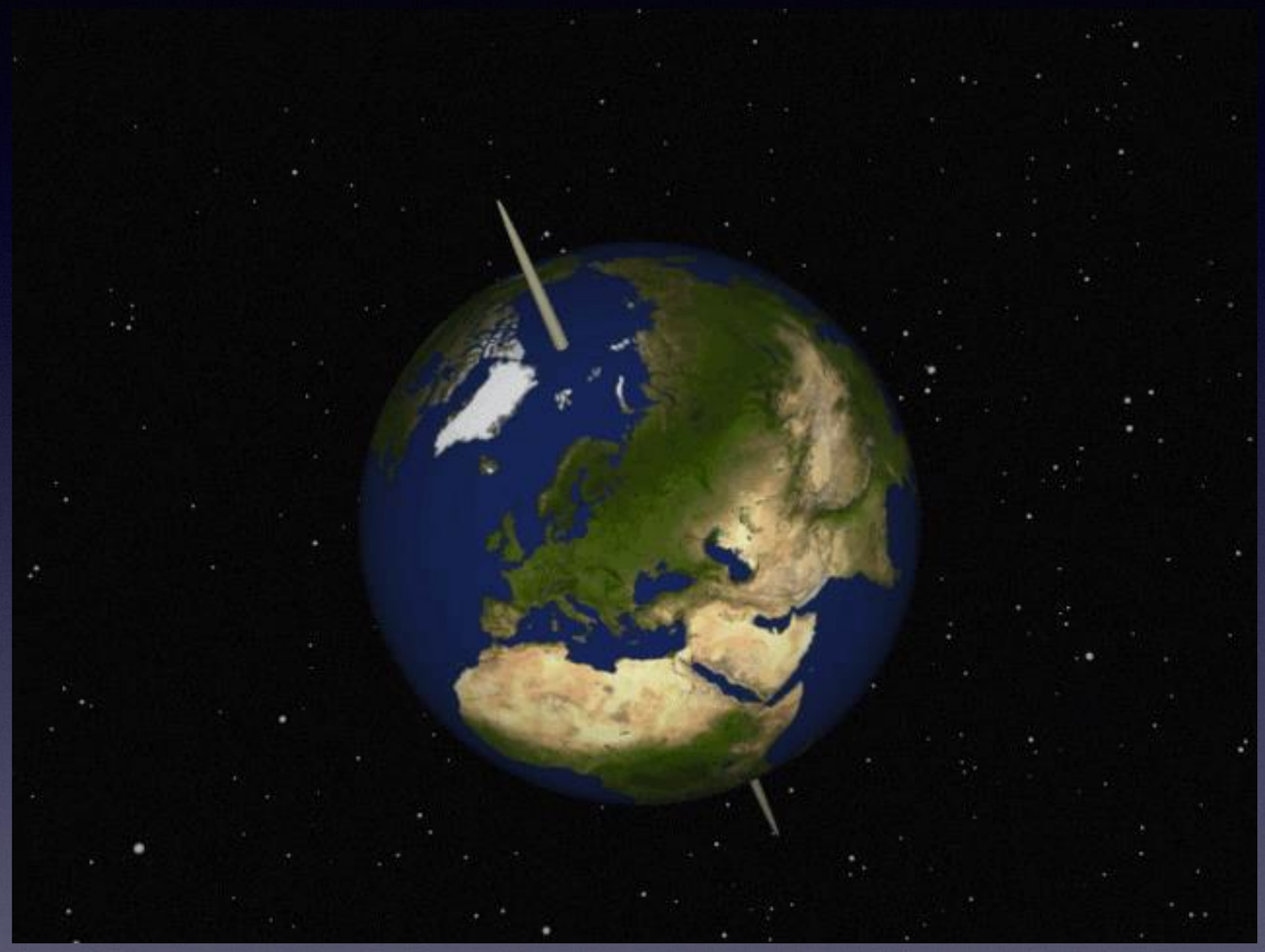


The Moon orbits Earth from a viewpoint above the North Pole in this animation. The blue gridlines show how the same side of the Moon always faces Earth. Not to scale. *Credit: NASA's Scientific Visualization Studio*

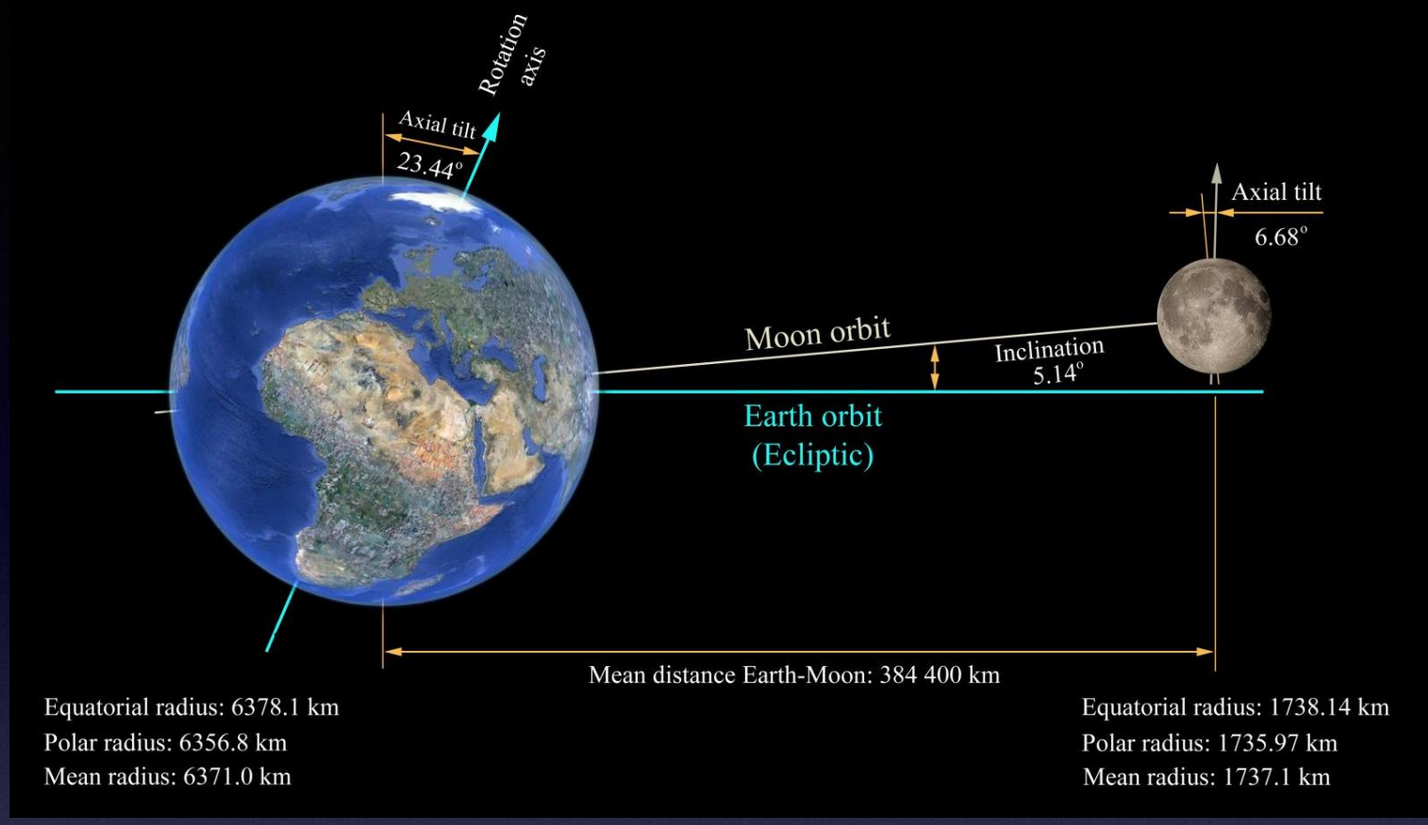
What is the difference between the earth's rotation and revolution?



The is how the Earth revolves around the Sun ..



This is how the Earth rotates ..



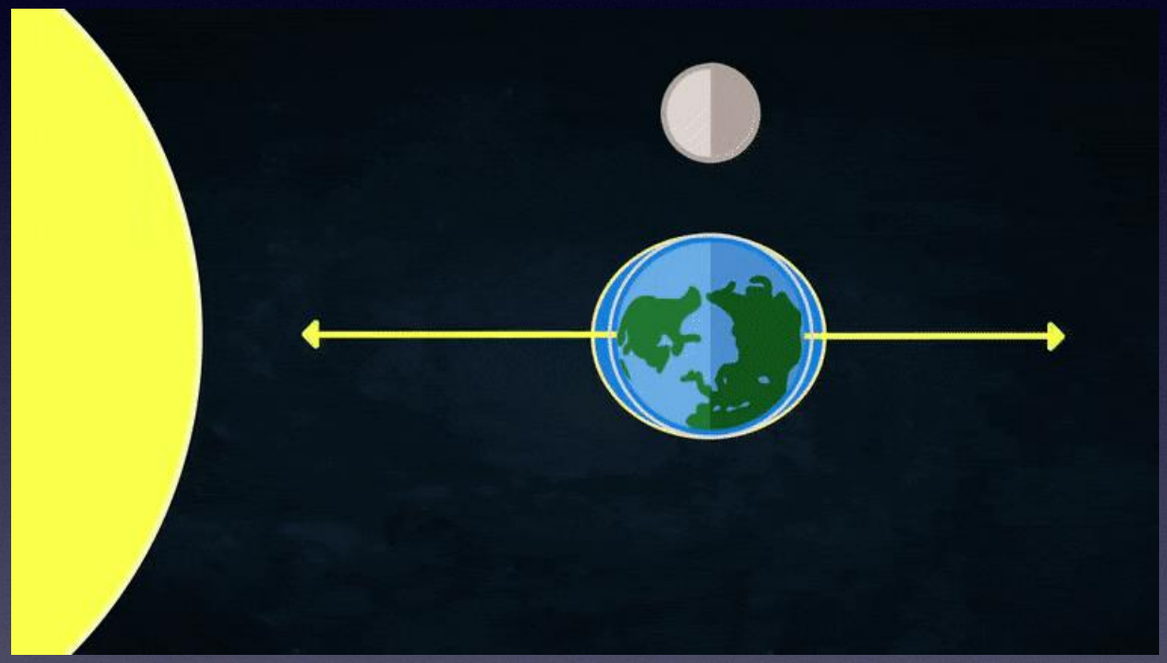
- The Moon's orbit is tilted about ***5 degrees*** compared to the plane of Earth's orbit around the Sun. Because of this tilt, the Moon as seen from Earth's perspective usually passes above or below the Sun when it passes between us and the Sun. The tilt of the Moon's orbit prevents us from having monthly solar and lunar eclipses.

What are the natural phenomena of the Moon?

- A **lunar eclipse** occurs when the Earth moves between the sun and the moon, blocking the sunlight that is normally reflected by the moon. A solar eclipse occurs when the moon is directly between the sun and the Earth, casting a shadow on the Earth.

Also ..

- The moon's gravitational pull on the Earth is the main cause of the **rise and fall of ocean tides**. The moon's gravitational pull causes two bulges of water on the Earth's oceans—one where ocean waters face the moon and the pull is strongest and one where ocean waters face away from the moon and the pull is weakest



What does the moon have to do with the calendar?

- **Because keeping track time was so vital, people turned to a reliable source: the moon**. As a result, a calendar was created using the phases of the moon. It may not be used a lot today, but it was a tool that played a significant role in people's daily lives for centuries. And, it's influence can still be felt today.

- Although solar calendars, which are determined by the solar and have influenced the Gregorian Calendar, lunar calendars were essential. And, there can impact can still be felt today.

Overview of a moon calendar (Hijri Calendar) ..

- A moon calendar, or more commonly called a lunar calendar, is easy to define. It's a calendar that follows the monthly cycles of the phases of the moon. It's one of the oldest calendars in the world that creates lunar months, also known as synodic months. Don't get caught up in the complicated terminology. A lunar month is simply one that occurs between two successive syzygies, such as new moons and full moons.

- The Hijri Calendar started with the "Hijera", the time when Prophet Mohammed (PBUH) moved from Makkah to Medina.

Historically ..

- The Hijri Calendar was introduced by Umar ibn Al-Khattab, who is a companion of the Prophet Muhammad (PBUH), in 638.

- It is based on the lunar calendar, which relies on how the moon moves through its phases.

The days between each moon phase.

- on average, there are 29.53 between each phase of the moon. Well, some incredibly smart people figured out a long time ago that a new moon appears every 29.53 days. It should be noted. However, that does vary just slightly. Some months it's 28 days while others can be 30.

- What's fascinating is that it takes the moon around 27.3 days to orbit the earth. However, it needs 2.2 days to "catch up." The reason? Our little third rock from the sun travels roughly **45 million miles around the Sun during the time the Moon completes one orbit around Earth**.

Are lunar calendars more accurate?

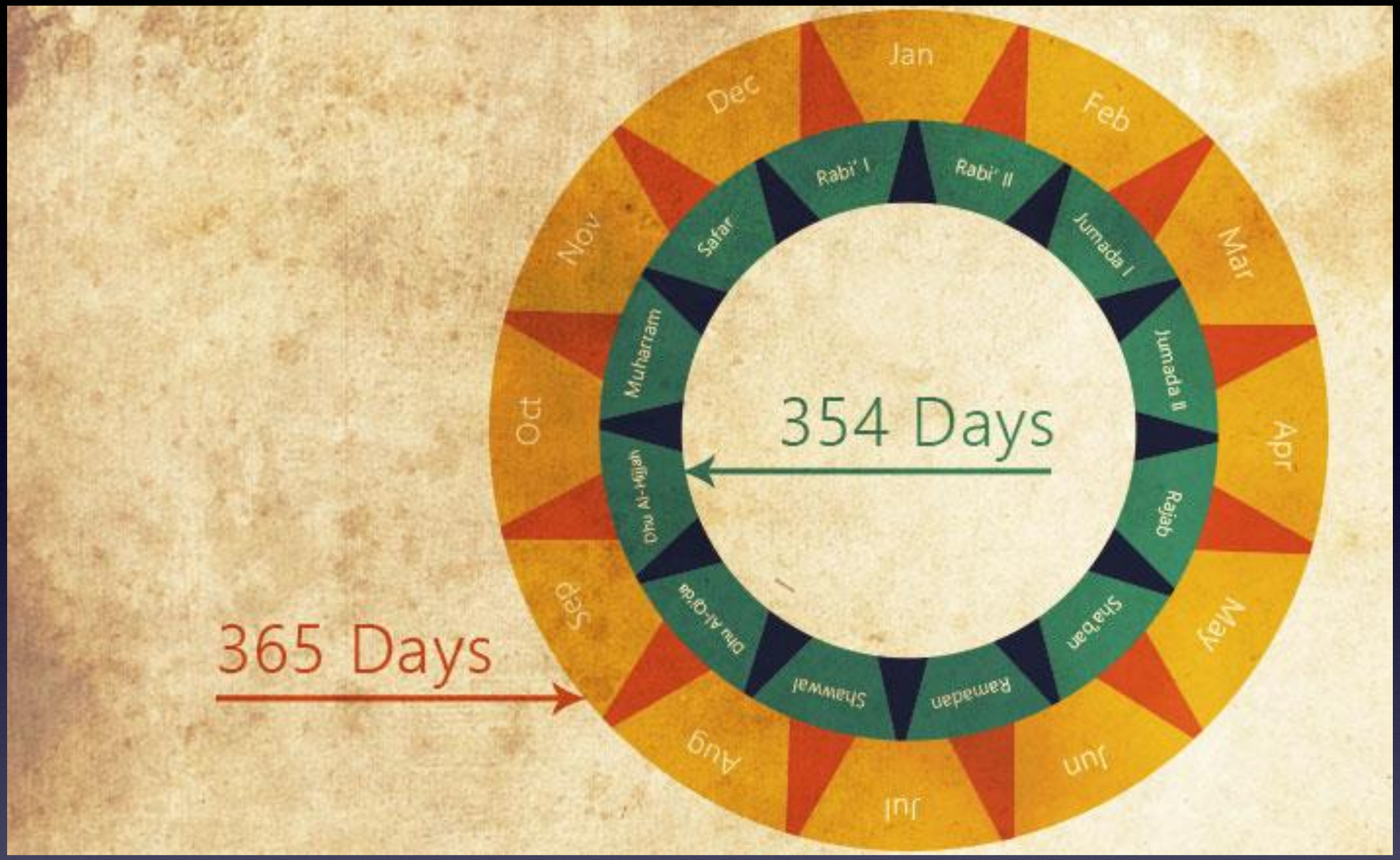
- Lunar calendars may have been accurate when establishing months. But, it's a bit off when it comes to the number of days there are in a year.

- After three years, the lunar calendar would be about a month behind the solar Gregorian Calendar. Some moon calendars have taken this into account and get back in sync with solar calendars every 33 years.

Lunar vs Solar ..

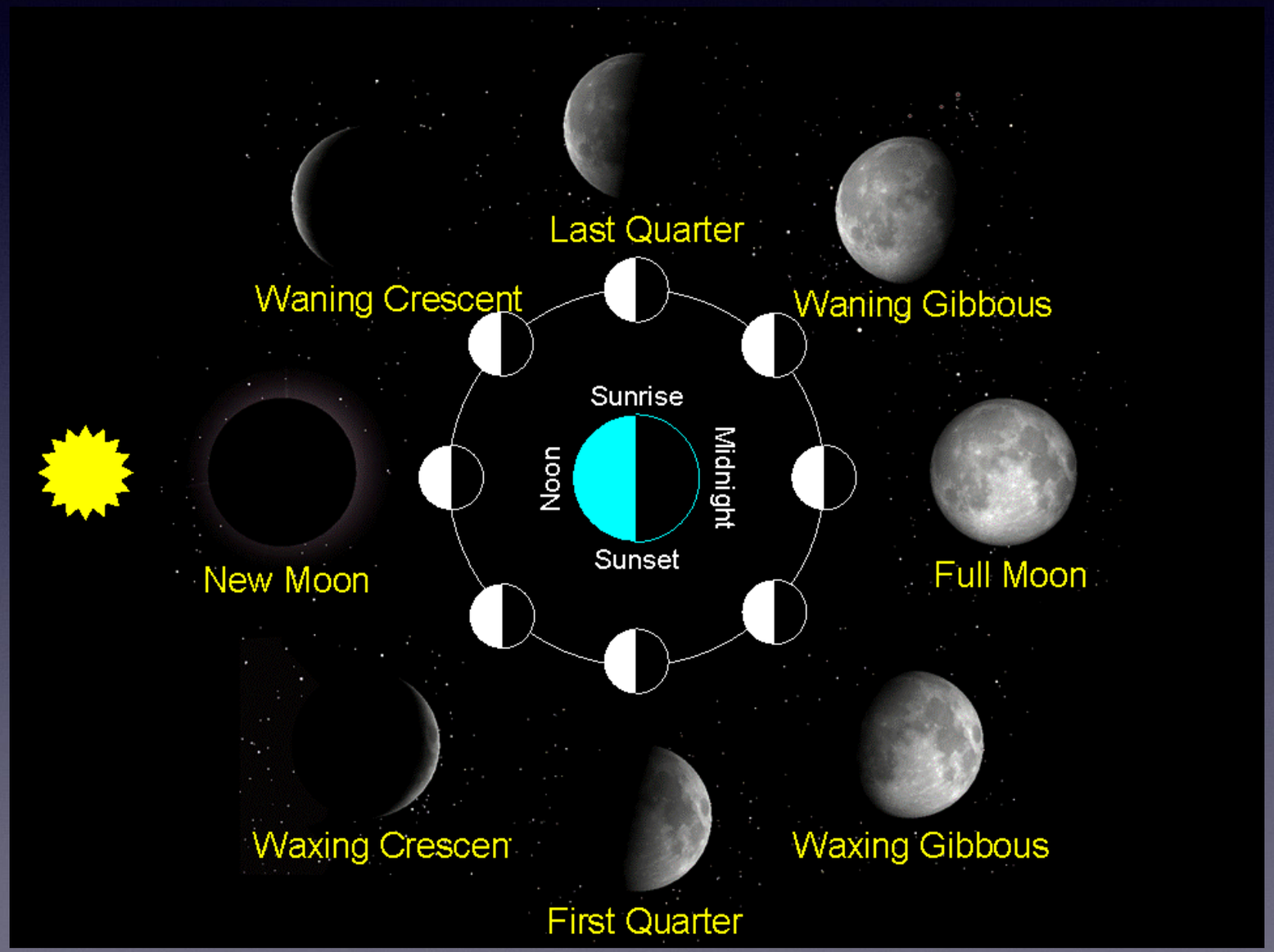
- Solar calendars also have their flaws. Take leap years as an example. They were meant to address inaccuracies. But, one day still drifts around every 3216 years. Lunar calendars, on the other hand, only have an error of merely 2 seconds annually. If you're keeping track, that comes out to 1 day every 31,250. If you were to use this measure then, lunar calendars are ten times more accurate then the Gregorian Calendar.

- The Lunar (Hijri) Calendar is always 11 days shorter than the Gregorian calendar (hence, if your company uses the Hijri Calendar, lucky you.)



A year in the Hijri calendar is equivalent to 354 days and is made up of 12 months, named:

Moon Phases ..


Last Quarter
Waning Crescent
Waning Gibbous
Sunrise
Noon
Midnight
Sunset
New Moon
Full Moon
Waxing Crescen
Waxing Gibbous
First Quarter

Simply..

2022 Moon Phase Calendar

Moon phases based on time zone UTC-7

January

Su	M	Tu	W	Th	F	Sa
						1
	3	4		6	7	8
	10	11	12		14	15
16		18	19	20		22
23	24		26	27		29
30						

February

Su	M	Tu	W	Th	F	Sa
		1	2	3		5
6	7		9	10	11	
13	14	15		17	18	19
	21	22		24	25	26
	28					

March

Su	M	Tu	W	Th	F	Sa
		1		3	4	5
	7	8	9		11	12
13		15	16	17		19
20		22	23		25	26
27		29	30			

April

Su	M	Tu	W	Th	F	Sa
					1	2
3		5	6	7		9
10	11		13	14	15	
17	18		20	21	22	
24	25		27	28	29	

May

Su	M	Tu	W	Th	F	Sa
1	2	3		5	6	7
	9	10	11		13	14
	16	17	18		20	21
	23	24	25		27	28
29		31				

June

Su	M	Tu	W	Th	F	Sa
			1	2		4
5	6		8	9		11
12	13		15	16		18
19		21	22	23		25
26	27		29	30		

July

Su	M	Tu	W	Th	F	Sa
					1	
3	4	5		7	8	9
	11	12		14	15	
17	18	19		21	22	23
	25	26	27		29	30
31						

August

Su	M	Tu	W	Th	F	Sa
		2	3	4		6
7		9	10		12	13
14		16	17		19	20
21		23	24	25	26	
28	29		31			

September

Su	M	Tu	W	Th	F	Sa
				1	2	
4	5		7	8	9	
11	12		14	15	16	
18	19	20		22	23	24
	26	27	28		30	

October

Su	M	Tu	W	Th	F	Sa
						1
	3	4	5		7	8
	10	11	12		14	15
16		18	19	20		22
23	24		26	27		29
30						

November

Su	M	Tu	W	Th	F	Sa
		1	2	3		5
6	7		9	10	11	
13	14	15		17	18	
20	21	22		24	25	
27	28	29				

December

Su	M	Tu	W	Th	F	Sa
				1	2	3
	5	6		8	9	10
	12	13	14	15		17
18		20	21	22		24
25		27	28		30	31

https://www.vertex42.com/calendars/moon-phase-calendar.html

References

- https://moon.nasa.gov/moon-in-motion/overview/
- https://socratic.org/questions/what-is-the-difference-between-the-earth-s-rotation-and-revolution
- https://www.nationalgeographic.com/science/article/moon-facts
- https://www.calendar.com/blog/moon-calendar/
- https://destinationksa.com/all-you-need-to-know-about-the-hijri-calendar/
- https://sureshemre.wordpress.com/2014/08/31/moon-stabilizes-earth-2