# MOON SIGHTING & THE UMM AL-QURA CALENDAR

Ibn Umar (may Allah be pleased with him) reports that the Prophet (peace be upon him) said:

"The month is twenty nine days. So do not fast until you <u>see</u> the crescent of the moon and do not stop fasting until you <u>see</u> it. Thus if it is cloudy upon you, then complete the period of thirty days."

Narrated by Imam Muslim in his Sahih

#### Introduction

The Umm al-Qura calendar is the official lunar calendar system of Saudi Arabia and is used in the Middle East and by many Muslims across the world to establish the start of the Islamic month. Contrary to popular belief, the Umm al-Qura calendar system is not established on actual moon sighting but the certainty that the moon will be seen somewhere in the world within a given period. This leaflet will explain the difference between 'actual' and 'certain' moon sighting, will explore the flaws in the calendar system and how it has divided instead of uniting the Ummah.

#### 'Actual' versus 'certain' moon sighting

The moon exhibits different phases as the relative geometry of the sun, earth and moon changes; appearing as a full moon when the sun and moon are on opposite sides of the earth, and as a new moon when they are on the same side (lunar conjunction). The lunar conjunction cannot be seen with the naked eye nor even by the most powerful telescope, as the light being projected onto the moon cannot come to earth. As the earth continues to rotate and the moon travels on its orbit, there comes a point (moon age) at which the light reflected off the moon can be seen from earth; this thin crescent of moonlight, when seen by the naked eye, is what marks the start of the Islamic month.

Lunar Conjunction: "The event when the earth, moon and sun, in that order, are approximately in a straight line. Also known as the 'birth' of the moon or 'new' moon."

Astronomers and Muslims across the world track the moon from conjunction in an attempt to obtain the earliest visibility of this new moon. Although there is no official or authenticated record for the youngest moon seen, most astronomers and Ulama believe a moon 15 hours old can be seen with the naked eye if all other factors, like weather and moon altitude, at sunset are favourable.

What does all this have to do with 'actual' and 'certain' moon sighting ? Well, it comes down to what you do when the moon is not seen in your location, city or country at sunset. A simple example of a country which utilises 'actual' moon sighting is Pakistan. Pakistan will look to countries east of itself and regions up to the west border of Pakistan. If the moon has actually been seen by a Muslim, been witnessed and verified in Pakistan after sunset or in countries east of Pakistan then this is sufficient to begin the Islamic month. This principle for moon sighting is known as 'Immediate Horizon' and is based on 'actual' moon sighting.

Immediate Horizon: "The location (longitude) where at sunset the moon is of a sufficient age to be seen with the naked eye."

The Umm al-Qura calendar of Saudi Arabia also uses the principle of 'Immediate Horizon' but with an important difference; unlike Pakistan who only looks east where the sun has set, Saudi Arabia also looks west to countries where the sun has not set. The scan towards the west for locations where the moon is 'certain' to be seen continues until dawn the following day in Mecca; this is the 'Limiting Horizon'.

**Limiting Horizon:** "The location (longitude) where at sunset the moon is of a sufficient age to be seen with the naked eye and dawn has not occurred in Mecca."

The Umm al-Qura calendar allows for the new Islamic month to be announced in Mecca at sunset based on the 'certainty' that before dawn the following day in Mecca, someone in countries west of Mecca will see the moon. This principle of moon sighting is not based on 'actual' moon sighting but on the 'certainty' the moon will be seen somewhere by Muslims.

## How the Umm al-Qura calendar works

Limiting Horizon is calculated as follows:

- The sunset of Mecca marks the start of a new Islamic day.
- On the day of the birth of a new moon, the sky over Mecca will be checked.
- If visibility is not possible then a 'scan' towards the west begins.
- This 'scan' towards the west requires the sun to set over that location (country) west of Mecca so the new moon can be seen.
- As the 'scan' towards the west continues, the clock is ticking in Mecca (through their night).
- This 'scan' to sight the moon in western countries continues until the night is finished and dawn breaks in Mecca.

If during the interval between sunset and dawn the following day in Mecca, the moon becomes visible in any country to the west of Mecca then this is considered a new Islamic month using the Umm al-Qura calendar.

## So to calculate the start of any Islamic month you need to following information:

- What day will the new moon will be born
- The sunset time for that day in Mecca
- The dawn time for the next day in Mecca
- Longitude of Mecca (39.8° east of the Greenwich Meridian)
  - Divide the world into longitude minutes to gain "Limiting Horizon" (where you stop looking for a new moon)
    - The earth rotates around its axis (360°) once every 24 hours
    - So 24 hours (or 24 x 60 = 1440 minutes) correspond to 360°
    - So every 4 minutes the earth rotates by 1°
- Calculate the minutes between sunset and dawn to gain the number of degrees the earth would have rotated and that gives the last country for which moon sighting will be accepted in Mecca (Limiting Horizon).

## How the start of Ramadhan 1431 / 2010 was calculated using this system:

- New moon was born on Tuesday 10<sup>th</sup> August 2010
- Sunset on the 10<sup>th</sup> in Mecca was 18:55
- Dawn (Fajr) the following day (11<sup>th</sup>) in Mecca was 4:33
- Difference in minutes : 578
- Translate minutes into degrees (578 / 4) : 144.5°
- Mecca is -39.8° from Greenwich Meridian
  - o 39.8 needs to be taken off 144.5 since longitude is set to zero at the Greenwich Meridian
  - 144.5° 39.8° = 104.7°
- The result was that the 'certainty' of the moon being sighted before the longitude of 104.7° was sufficient for Saudi Arabia to begin Ramadhan on 11<sup>th</sup> August 2010.
- 'Actual' moon sighting in Australia, Europe, Middle East and Africa was impossible on that evening.

#### The image below show where the longitude of 104.7° lies and the visibility information for the evening of the 10<sup>th</sup> August 2010:



Dotted Line: Limiting Horizon of 104.7°

#### The start of Ramadhan 1431 / 2010 illustrated the problems with this calendar system:

- The moon was not visible (Immediate Horizon) until sunset over South America, many hours after the sunset over Mecca.
- The people of Mecca had prayed their Isha and Tarawih and gone to bed before a single human actually saw the moon.
- Immediate Horizon occurred west of the UK many hours after sunset in the UK, resulting in division between Muslims who carried out actual moon sighting and followers of the Umm al-Qura calendar.

## Predictions for Ramadhan, Eid-ul-Fitr and Hajj

When the moon is born east of Mecca and visibility is possible over Mecca (Immediate Horizon), the Ummah will experience a natural flow from west and back around to the east for the start of the Islamic month based on 'actual' moon sightings. This is when Saudi Arabia and all Muslims west of Saudi Arabia will start an Islamic month on the same day.

When the principle of 'Limiting Horizon' is used with the Umm al-Qura Calendar, we will see the disjointed and unnatural start of the Islamic month in countries like the UK when Muslims will start the Islamic month on different days.

Due to the pre-calculated and fixed nature of the Umm al-Qura calendar it is easy to predict the years in which Limiting Horizon will cause division for Muslims in the UK.

	Year	Ramadhan	Eid-ul-Fitr	Hajj / Eid-ul-Adha
2	1432 / 2011	$\checkmark$	×	$\checkmark$
100	1433 / 2012	×	$\checkmark$	$\checkmark$
	1434 / 2013	$\checkmark$	$\checkmark$	×
	1435 / 2014	$\checkmark$	×	$\checkmark$
10	1436 / 2015	$\checkmark$	×	$\checkmark$

Limiting Horizon used by Saudi Arabia will result in people in the UK starting on different days

 $\checkmark$  - Moon seen east of Mecca will allow all people in the UK to start on the same day

## Summary:

As long as Saudi Arabia continues to enforce a global calendar and some people outside the Gulf States continue to follow blindly, we will continue to have the problem of people within a country (or even town) starting the Islamic month on different days. Allowing a new Islamic month to begin on the 'certainty' the moon will be seen as against the Hadith of our Prophet (peace be upon him) and will result in division in the Ummah.

The simple fact is that at any given time, somewhere in the world it is night and somewhere it is day; this is Allah's design. The start of the Islamic month is a regional phenomenon (like the day or night) which sweeps west across the world beginning from the country / longitude where the moon can actually be seen and back around to eastern countries the following day.