

# Use of Optical Aids for UK Moon Sightings

(Adapted from a Istiftaa to major Darul Uloom by Eng. Qamar Uddin, ICOUK; dated 9 June 2024)

## 1. Introduction

We have been asked about the use of Optical Aids for UK Moon Sightings for the past 1 year (since 2023) by some of our UK moon sighters. And there are two opinions: one group says we should only use naked-eye sightings, which is the *Sunnah* position. And the other group says, that because of our geographical location, where the UK being a high latitude country (and an Island between two oceans), subject to a lot of cloudy weather throughout the year, we should allow the use of Optical Aids for moon sightings, especially as we have a lot of past fatawa allowing it [1].

However, there is a change of technology since the old Fatawa were issued some 50 years ago or more. So, we were advised to refer the matter back to senior scholars, explaining the modern technology used for the UK moon sightings, such as computerized telescopes with digital cameras. Therefore, the following technologies or practices used in the UK needed to be explained so the answers to the question ("Is optical aids allowed for moon sighting?") obtained precisely in the correct contexts, since the technologies used in the old fatawa (from the 1930s to 2000), were not as advanced as currently in use.

## 2. How the Human Eyes Work

Before explaining how modern optical aids behind the human eye work, we need to explain how the human eye works, so the answers are in the correct context. So, let's look at how the human eye works from the anatomy of the human eye. As you can see from **Figure 1**, the light from an object comes to the lens of the human eye, and it bends and focuses on the retina (on the back of the eyeball). Note that this concept of *light from the object to the eye* was first developed by early Muslims, as early as the 10<sup>th</sup> century, by Hasan Ibn Al-Haytham (c.965 – c.1040) [2], who developed the *camera obscura* that we use in modern cameras these days. As you can see from Figure 1, the light coming from the object (candle) enters the eye lens then bends and focuses on the retina. The optic nerves then take these light signals (photons) to the brain, which constructs the image in the visual cortex part of the brain. So, in this case, a normal eyesight perfectly sees the image, very clearly. That's what we call normal vision.

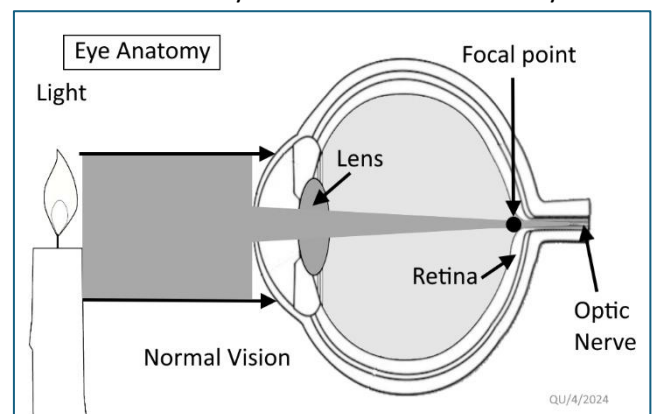


Figure 1: Eye Anatomy - Normal Vision

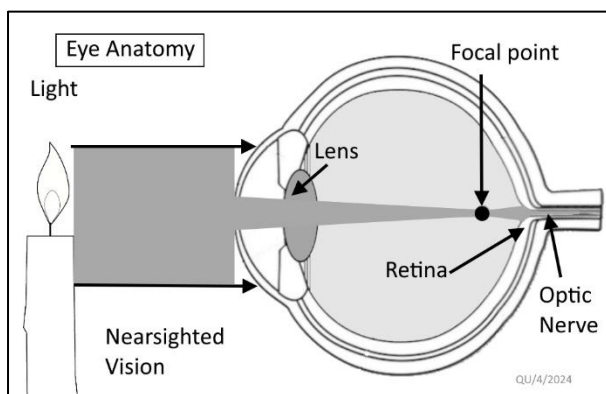


Figure 2: Eye Anatomy - Nearsighted Vision

Now, if we look at a situation when a person is shortsighted or nearsighted (as in **Figure 2**), so they see the object blurry, and the reason is that the eyeball is wider, and therefore the focal point, where it focuses, is somewhere in between the eyeball and not perfectly on the retina. Therefore, they get a blurry vision. So, how can we make a correction so we can put this focal point back onto the retina for the vision to become clearer?

We can do this correction by putting a lens in front of the eye to help the weak muscles of the internal lens of the human eye to move the focal point from somewhere in the middle of the eyeball, back onto the retina, to work as a corrected vision of

<sup>1</sup> UK Major Lunar Standstills Istiftaa (<https://bit.ly/StandstillsQA>)

<sup>2</sup> Hasan Ibn al-Haytham ([https://en.wikipedia.org/wiki/Ibn\\_al-Haytham](https://en.wikipedia.org/wiki/Ibn_al-Haytham))

good eyesight (as in **Figure 3**; for nearby distances). And so, now the optic nerve takes that corrected photons of the image to the brain and helps the person see it clearly. So, that's how the human eye works. Note the light from the object is always passing through the lens and reaching the human eye and therefore we consider that as a true vision has taken place or in the jargon of jurisprudence, "Ruyah" (i.e., seeing by the human eye) has taken place, because the light of the object (or the moonlight) has entered the human eye.

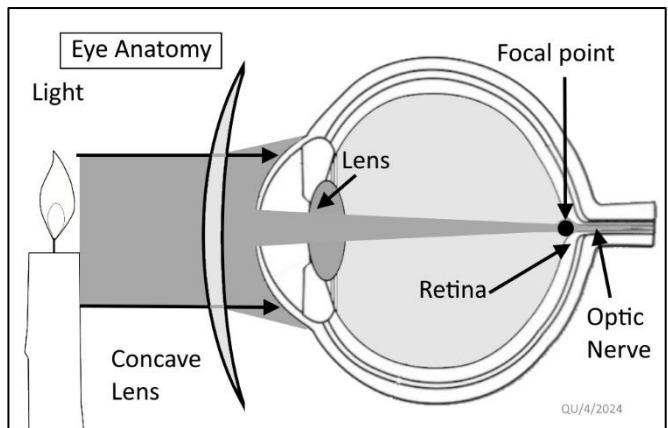


Figure 3: Eye Anatomy - Corrected Vision

### 3. How Telescopes Work

Now, let's consider how a telescope works. Realise that the original telescope was a refracting telescope, or a Galilean telescope, which was simply a tube with two lenses (see **Figure 4**). One lens at the front is the objective, which is larger, and other one is the eyepiece, which is smaller at the other end. And there is mathematics to prove that the magnification takes place, based on the distance of the objective to the focal point and the distance of the eyepiece to the focal point. So, if we divide the focal distance of the objective by the focal distance of the eyepiece, then we get

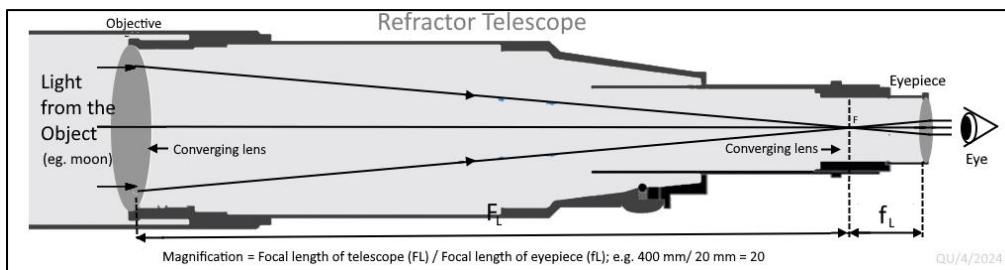


Figure 4: Refracting Telescope

the magnification [3]. So, if the focal distance of the objective is 400 mm long, and the focal distance of the eyepiece is 20 mm long, then 400 divided by 20, we get 20 times magnification. Remember, we are looking for the whole of the

moon's shape to see the crescent (Hilal) and therefore we cannot have a huge magnification, such as for looking at a small part of the moon, like the crater, or a very, very faint object. Note that the same light of the object is entering the eye through the lenses. So, in the case of optical aids, such as a telescope, where the moonlight is still entering the eye (and it is not being created by the telescope), but it is still showing the real image of the moon.

### 4. How Binoculars Work

Now, let's look at how binoculars work, which are made of two small refracting telescopes, side-by-side (see **Figure 5**). They take the light of the object and bring it to the eye, so we get more clearer (3D) image. But there is a little difference from seeing the object directly with the eye. The object with the telescope gets inverted, because the top rays of light from the objective

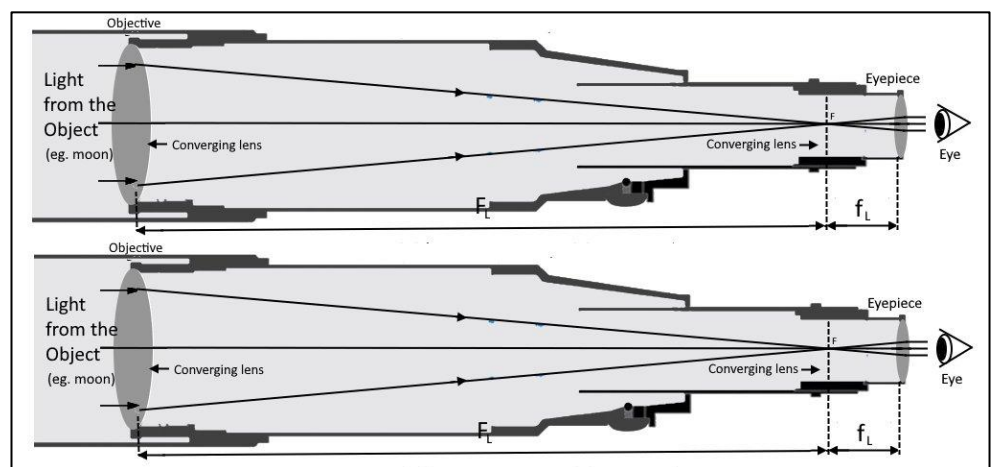


Figure 5: Two Telescope Tubes (for binoculars)

come to the bottom rays of the eyepiece, and the bottom rays go to the top, causing an inversion. This inversion is not a problem for looking at the stars, as it doesn't matter if it's upside down, even if you're looking at the moon, it doesn't

<sup>3</sup> Calculating Refracting Telescope Magnification (<https://www.a-levelphysicstutor.com/optics-telescopes.php>)

matter if the whole moon is upside down, but the crescent would be flipped. However, it's confusing to look at any terrestrial objects, in landscape, such as for watching birds or sports players at a distance, upside down.

## 5. How Binoculars Reinvert the Images

Since binoculars are made of two small refracting telescopes that also invert the images, how can we get them reinverted for normal eye vision? That's where we use some lens blocks called porro-prisms. The porro-prism lens blocks bend the light ray multiple times to reinvert the image back to normal way up. As with the telescopes, it also magnifies it based on the ratio of the focal lengths of the objective and the eyepiece. The function of using porro-prism as corner-blocks also makes the tube shorter for easily carrying in a handbag (see **Figure 6**). There is a separate video given on the YouTube version of this article that shows the animation of how binoculars reinvert the images for normal eyesight [4]. And, as before, light from the object (or the moonlight) still comes through multiple lenses and reaches the human eye so technically "Ruyah" has taken place. So, in summary, binoculars are like small telescopes, but they have two tubes and two porro-prisms, to both magnify the object (to make it easier to see) and to reinvert the image the right way up. And this is important for looking at landscape objects, like birds, trees, and other

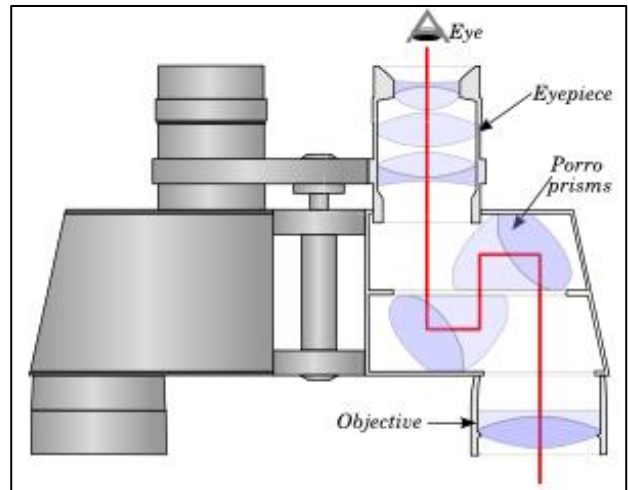


Figure 6: Porro-prisms reinvert the image

objects from a distance. Now from our past 10 years or so data in the UK, we have found that we can see an object with the naked eye within HM Nautical Almanac Office (HMNAO) Code A and B; and in the borderline case of Code B and C, after using binoculars to find the moon. But the Code C sightings were very few over the past 10 years; probably about 3 or 4 cases when the sky was very clear, but most of the time it was Code A and B.

## 6. How Digital Cameras Work

Let's look at how digital cameras work. Digital cameras use lenses to focus the image of the object onto a sensor. Unlike in the previous case where the human eye was behind the lenses, there is no human eye behind the camera lens (see **Figure 7**). It is the microprocessor sensors that the image focuses on and then the microprocessor takes that image (and sometimes applies filtering to remove bright sunlight from the image) to capture the light photons coming from an object like the moon. So, image processing takes place to generate or reconstruct the image and then it stores it in its internal memory card and displays it on the LCD screen for the human eye to see. So, what the human eye sees is not the direct image of the object, because there is no direct light of the object (or the moonlight) entering the

human eye. It is entering the processor sensor, which converts the image pixels into electrical signals. These signals are further processed to create the final image. There is a short YouTube video that explains the technical details of a camera sensor which is worth watching [5]. So, there is a significant difference between optical aids and digital cameras. Optical aids still pass the moonlight through to the human eye, whereas a digital camera or an Astro-camera (using CCD or CMOS sensors) that does filtering of sunlight, does **not** pass the light to the human eye. It is a reconstruction of the light signals that the camera sensor pixels have detected!

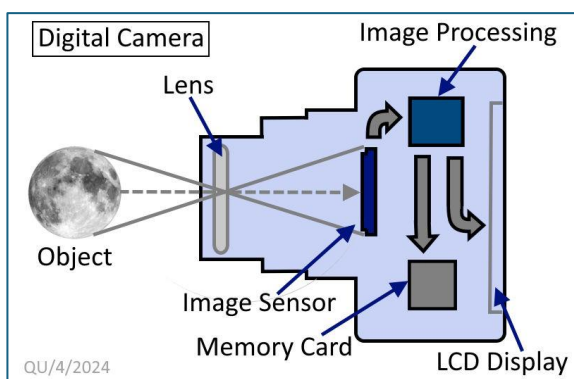


Figure 7: Digital Camera Image Processing

4 How do binoculars work (porro-prism) (<https://youtu.be/yKoADmJqK6s?t=120s>)

5 How Camera Works? | Working Mechanism of Camera ([https://youtu.be/8WLRKEij\\_D0](https://youtu.be/8WLRKEij_D0))

## 7. How to use HMNAO Visibility Maps

Let us now look at the HMNAO visibility map codes, and how we can predict the visibility of the moon at any location on Earth. Consider the visibility maps from 5<sup>th</sup> August 2024 (Safar 1446) Hilal in **Figure 8**, where most of the equatorial countries and Southern Hemisphere were Code A, so they were easily able to sight the moon because it was rising from the opposite Hemisphere. But the UK being a high-latitude country, it was in Code C, so it was only possible to see it if it was found with optical aids first, before seeing it with the naked eye.

The HMNAO visibility maps have been tested worldwide for its accuracy, and we have done so for naked eye visibility in the UK over the past 10+ years (since 2008). So, **Code A** is easily visible by the naked eye (or unaided eye). The **Code B** is visible if the weather is perfect (and then you will see it by the naked eye). And in **Code C**, you may need optical aids like binoculars to find the moon, and then you may (or may not) see by the naked eye, depending on the weather condition. And, as you can see from the map, on Monday **5th August 2024**, for the Safar 1446 moon, in the UK was in Mid-Code C and we had three people who travelled for clear skies to Margate (Kent), and they were able to see the moon with binoculars only.

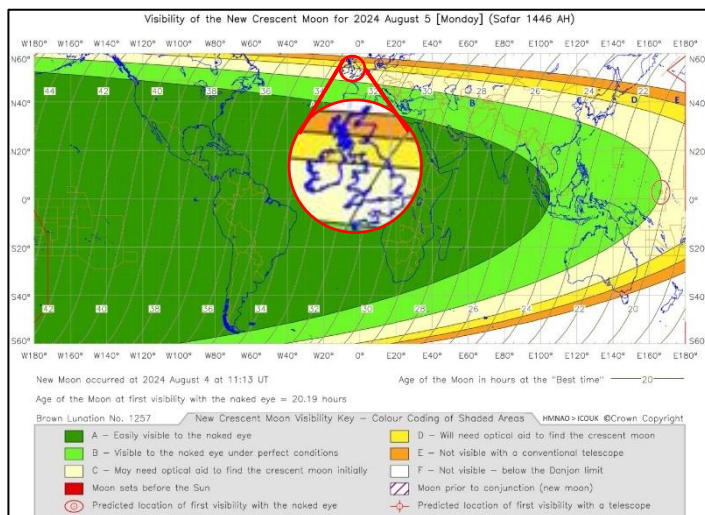


Figure 8: Visibility Map for 5 August 2024 (Safar 1446)

And their report is on the ICOUK website for Safar 1446 page ([bit.ly/Results1446-02](http://bit.ly/Results1446-02)) with their declarations. The **Code D** areas will need optical aids for people to see the moon. And for **Code E**, it's not possible to see with conventional telescopes. The CCD imaging capability is not included/built into the HMNAO visibility maps, like some other maps because the author, Dr Bernard Yallop, was of the view that this is not in the *visible-light* wavelength range. It is in the *infrared* wavelength range. Therefore, he did not feel the need to include CCD imaging detection of the moon on these maps. And **Code F** is totally invisible because there isn't enough angular separation between the sun and the moon. That is, there is not enough *elongation* (or it is too low on the horizon) so it's not possible to see by any means. And obviously, if the *moon sets before the sun*, then it is impossible to see because the moon is not in the sky! So, in summary, from our past 10+ years or so data, we found that the naked eye can see the moon within Code A and B, and with binoculars could possibly see Code C, and in one case it was also possible to see Code D, if the weather was exceptionally clear above the moon's position (see [bit.ly/Results1446-09](http://bit.ly/Results1446-09)). So, one of the questions we had is, can we allow the use of optical aids in the naked eye range only, and **not** in the optical aids range (Code C-D)? That was one of the questions to the senior scholars of Darul Uloom (see *Istiftaa* below).

## 8. Summary of Optical Aids Technology

In summary of the optical aid technology explained above, the human eye uses the lens to focus the light onto the retina, and optical aids help the light to focus on the eyepiece, and then it brings it to the retina in the normal way. The telescope and binoculars magnify the distant object. However, telescopes invert the image, whereas binoculars reinvert it back to the normal way up. In the case of all optical aids, the light of the object enters the human eye through the lenses. In the case of a digital cameras, the light of the object does **not** enter the human eye directly.

The HMNAO Visibility Maps can help us predict the crescent moon sightings at a given location, and if we use optical aids then it will help us sight the moon within the naked eye range, and possibly in the telescope range, too. So, that's the explanation of the current technology. Note also, the modern telescopes use computerized mounts, which can precisely locate the moon more accurately than manual telescope mounts. Furthermore, the optics have improved over the last 10 years so, whereby they can show the objects more clearly than it was possible in the previous decades.

## 9. Istiftaa on the Use of Optical Aids

The need to consider the use of optical aids arose due to the [Major Lunar Standstills](#) around of year 2025 (after 2006).

1. One of the appeals we made to several top Darul Ulooms is that the old fatwa from the 1930s needs to be reviewed because the technology of optical aids has changed, and the old fatawa of the time were only helping what was visible by the naked eye. But nowadays the technology seems to bring objects which is perhaps slightly outside the human eye visibility range, because of the accuracy of computerised mounts and improvement in the optics (lenses).
2. And there is a Hanafi ruling that if the skies are clear then the witness of one or two people will not be accepted. It must be a large group (*Jamme Gafir*). Currently, optical aids are not carried by large groups of people. Most people are looking for the moon with the naked eyes only and maybe one or two people will have a pair of binoculars or a telescope. So, we will not get a large group sighting with optical aids. This means that if we're allowing optical aids unconditionally, then it appears to contradict the requirement of *large group* sightings!
3. Therefore, we're appealing to the senior Ulama of Darul Ulooms to review the old Fatawa and limit the use of optical aids to naked eye range only (e.g., *HMNAO Code A - B*), so we can continue to get the possibility of large group sightings, if we want to ensure large group sightings in clear skies.
4. However, we should still take benefit of optical aids to find the moon, because in mainland Muslim countries like Morocco or Asian countries, cloudiness is an exception, and a normal clear sky is the norm. But it's the opposite in the UK where it is mostly cloudy, and in rare cases, it is very clear. So, can we still use optical aids to find the moon, and then see it with the naked eye or within the naked eye range (*Code A - B*)?
5. It is agreed by people of knowledge that CCD camera images cannot be used for testimony purposes because the testimony comes from a person and not from a computer-generated image which is like looking at a photograph. But what about using that CCD based Astro-cameras to **search** for the moon, so we know when we have found it and continue tracking it until after sunset, and then look at the moon with the naked eye or the optical aids?

### Past Fatawa Allowing the Use of Optical Aids (1930 - 2000)

1. Imdad al-Fatawi - by Maulana Ashraf Ali Thanvi (RH), vol.2, p.140,
2. Fatawi Haqqani - by Maulana Abdul Haq Haqqani (RH), vol.4, p.125,
3. Fatawi Dar Uloom Zakaria - by Mufti Razaul Haq (HA), vol.3, p.252,
4. Kitab al-Masail - by Mufti Salman Mansoorpuri (HA), Vol.2, p.124,
5. Fatawi Qasmiyyah - by Mufti Shabir Qasmi (HA), vol.11, p.443,
6. Fatawa Ramadhan - by Sheikh Saleh Al-Othaimeen (RH), vol.1, p.62,

## 10. Fatwa on the Use of Optical Aids

The above questions were sent in June 2024 to some of the top Darul Ulooms, including Mufti Taqi Usmani (HA) at Karachi Darul Uloom. Some of the Karachi Darul Uloom Ifta Department scholars researched the technology and investigated this issue in detail. They held multiple meetings/consultations (*shura/شورى*) and the result came about eight months later, in February 2025 (Shaban 1446). The first paragraph of the response stated: “According to our research so far, a telescope that increases the power/ability of the eye and with the help of lenses, etc., gathers the light of a celestial body on the horizon and increases its size, thus facilitating its viewing, seems to us to be correct according to **Islamic law** to consider the sighting of the moon seen through it as the actual sighting of the real moon.” That is, optical aids are permissible but not CCD camera images. So, they were saying that the “Ruyah” (sighting) still takes place because the moonlight is still entering the human eye, fulfilling the conditions of the Hadith: “*صُومُوا لِرُؤْيَيْهِ*”, meaning “begin fasting when you sight the moon” (Muslim) [6]. The meaning of “Ruyah” is seeing by the human eye, and when moonlight enters the human eye via optical aids, then it is permissible. The fatwa did not put any restrictions on the use of optical aids (as requested), because they said, this is due to individual experiences based on many other external factors, such as the practical experience of the observers, weather conditions, etc. So, if the “Ruyah” takes place (and all the other conditions are met, such as adult Muslim, reliable/not mistaken, etc.), which a testimony panel would need to establish, then optical aids are allowed. But certainly not Astro-cameras or digital cameras. You can read that fatwa on the ICOUK website fatawa page and/or on the [Ramadan 1446 page](#) with another detailed fatwa [7].

<sup>6</sup> Sahih Muslim, Book of fasting (Book 13, Hadith 21-22): <https://sunnah.com/muslim:1081b>

<sup>7</sup> Karachi Darul Uloom Fatwa – (1) 2683/41: <https://bit.ly/icoukOpticalAids> and (2) 2569/20: <https://bit.ly/chcOpticalAids>

One question asked for clarification was, how does optical aids allow large group sightings (*Jamme Gafir*) condition to be met? And the response came back was that it is possible to have multiple groups with one device being shared. For example, in the UK if multiple groups are looking for the moon, and each group had one pair of astronomy binoculars and multiple people see through it in clear sky, then that would meet the condition of group sightings. Otherwise, a minimum of two witnesses are required for cloudy weather (except for the start of Ramadan needing only one witness or news) [8]. The Karachi Darul Uloom Fatawa is on our website under the Publications > Fatwa section.

## 11. Towards a United Moon Sighting Criteria (UK)

However, not every group agrees using optical aids in the UK. Some groups think that we should only use the naked eye, like Morocco (who follows *Maliki Fiqh*), and that was the ICOUK previous criteria (UK - Morocco region) for naked eye range only before 2021. But since ICOUK have changed to local moon sightings (UK-only) and adopted *Hanafi Fiqh* with many fatawa from top Darul Ulooms [9], allowing the use of optical aids, the other groups may not agree with it (as they followed different foreign countries). So, can we find some common grounds to be united?

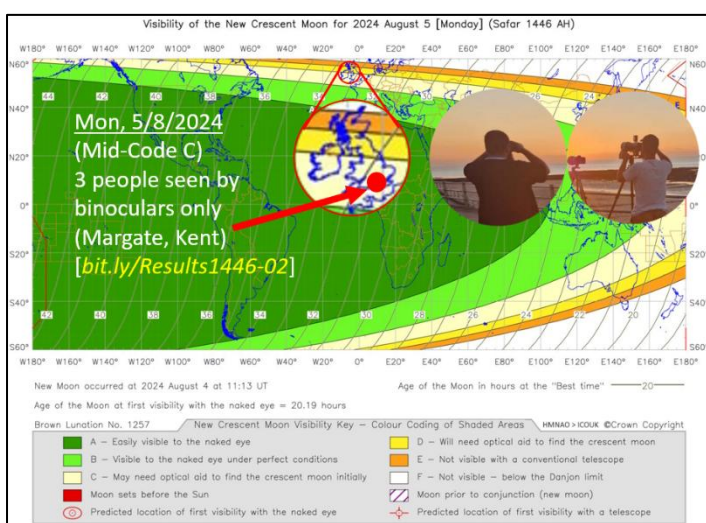


Figure 9: Safar 1446 Moon Sighting Report

fatawa (see the *Major Lunar Standstill* fatwa [1]) also agreed to accept it, as all the testimony conditions were met.

Let us now consider the UK winter months, when the moon visibility was/is starting from the Southern Hemisphere. The UK winter (Nov – Dec 2024) was going through a *Major Lunar Standstill* months, when the moon was very low altitude on the UK horizon and very high altitude in the spring (Mar – Apr 2025). It happens around every **18.6 years** and so on 2<sup>nd</sup> November 2024, it was *moonset-before-sunset* in the UK (as it was the 28<sup>th</sup> date), and so the moon was not visible in the UK and hence there was no sighting at all. But we had other groups jump from the UK to Morocco, where it was also not seen, and then they went 8,000 miles to South Africa and followed their moon sighting! So, they started the month on 3<sup>rd</sup> November 2024, even though the moon was totally invisible in the UK (even by optical aids)!

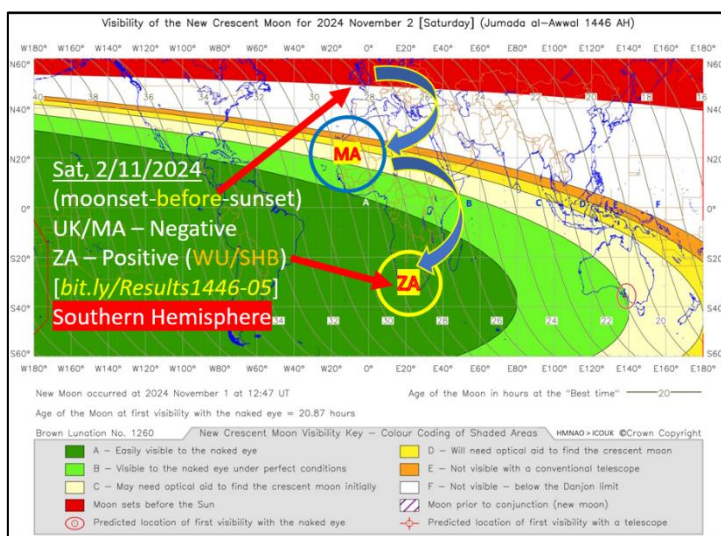


Figure 10: Jumada-I 1446 Moon Sighting Report

<sup>8</sup> ICOUK Hilal Testimony Procedure (<http://bit.ly/TestimonyPolicy>)

<sup>9</sup> ICOUK Moon Sighting Fatawa (<https://www.moonsighting.org.uk/fatawa>)

So, how can we unite on any one criterion by following different foreign countries, having different 29<sup>th</sup> dates? Note that it is possible for the UK to be 1 day before or after other countries in some of the months, and the same as other countries in other months, according to the different orbits of the moon (as shown by visibility maps [10]). Realise that, if the UK moon visibility meets the rule of 29 or 30 days/month (over a lunar year), then it is a “normal location” for moon sighting purposes, even though the UK has adverse weather, which could be overcome by having lots of groups throughout the UK looking for the moon on the 29<sup>th</sup>. The 29-30 days/month rule has been proven to be satisfactory.

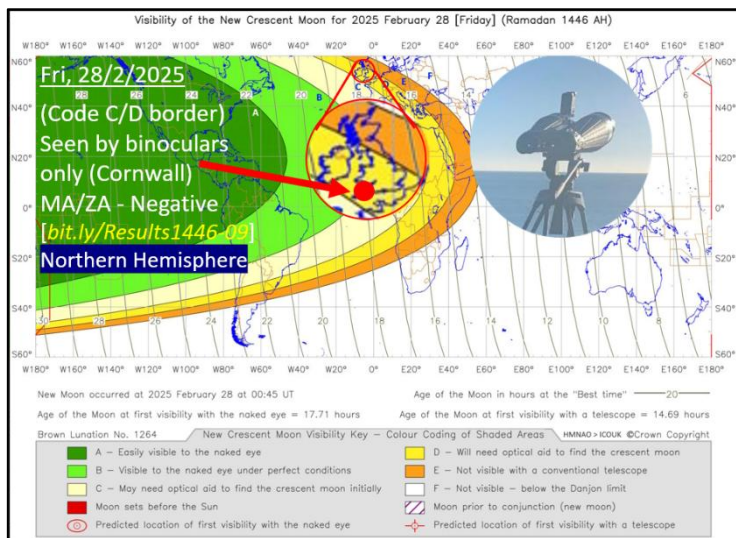


Figure 11: Ramadan 1446 Moon Sighting Report

can we unite on a moon sighting **boundary**, then we can agree on the details (e.g., number of witnesses or use of optical aids or not, etc). The ICOUK proposal is that we can achieve unity if we can (a) collaborate in all 12 months of the year and (b) agree on a common moon sighting boundary, because there is no problem with sighting the moon in the UK throughout the year (even though it may be sometimes a day later or a day earlier than other countries). Note that in the UK winter months, we have overcome the low-altitude moons by completing 30 days, even though it may not be visible on the 30<sup>th</sup>, based on the Shariah rule, “if it is cloudy then complete the month as 30 days” (Muslim) [11].

There is one question that we have coming up for Dhul Hijjah 1446 Hilal (on 27<sup>th</sup> May 2025), where the moon might be seen by the naked eye or by optical aids in clear skies. Should we accept optical aids or not? Those who do not accept it, will complete 30 days, but those who do accept it, then it would be a united start of the month. But jumping to other countries would not lead to unity because different countries will have different 29th dates. So, all UK groups really need to agree on the **UK-only boundary**, and then we can discuss the details (e.g. number of witnesses or the use of optical aids or not). However, even if they do not agree with the ICOUK testimony panel declarations, they should still send their UK moon sighting report to the ICOUK website ([www.moonsighting.org.uk](http://www.moonsighting.org.uk)) as it is a **National Database** for all the UK Muslims, regardless of the criteria they follow. Note also that there is a widespread belief that UK Eid-ul Adha should be on the same date as in Saudi Arabia. This is a **misconception** that was specifically clarified many years ago on the ICOUK website, which proved that Eid-ul Adha is **not** connected with Hajj, but with local moon sightings. *Note the Hajj (in Islam) came 7 years after Eid-ul Adha was started by the Prophet (ﷺ) at the same time as Ramadan in 2 AH* (Ref: <https://bit.ly/EidAndHajj>).

**Related:** (1) [Local and Regional Moon Sighting Boundary](#) / (2) [UK Moon Sighting Fatawa 1443/2022 \(English/Urdu\)](#)

<sup>10</sup> Visibility Maps (<https://www.moonsighting.org.uk/moon/visibility-maps.html>)

<sup>11</sup> Sahih Muslim, Book of fasting (Book 13, Hadith 6): (<https://sunnah.com/muslim:1080c>)

In the case of Ramadan Hilal on 28<sup>th</sup> February 2025, the moon was sighted by a highly experienced observer with binoculars (same as on 5<sup>th</sup> August 2024), but it was not sighted in Morocco or South Africa, because the moon visibility was starting from the Northern Hemisphere, the opposite side of the *Major Lunar Standstill*, and very high. So now the other groups who follow (or have been following) foreign countries, started disputing that we should not accept binocular sightings at all. But on 5<sup>th</sup> August 2024, the same groups were happy to accept binocular sightings and refused to accept them on 28<sup>th</sup> February 2025, which seems to contradict the rules from one month to the next! We should have consistent rules, so if we all

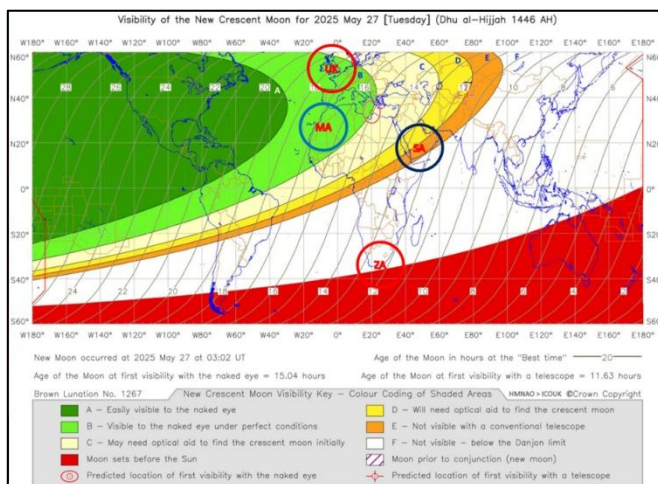


Figure 12: Dhul Hijjah 1446 Moon Sighting