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Implementation of the Method for Determining the Beginning of the Hijri Month and Conversion of the Date of Eid al-Fitr 2025 AD/1446 AH Gregorian – Hijri

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Abstract: This study focuses on analysing *the determination of the beginning of the moon as well as the transition from the Gregorian calendar to the Qamariyah calendar through the review of Islamic astronomy. The findings of this study suggest that the determination of the first day for the beginning of the calendar is possible by two methods, namely hisab and rukyat. In astronomical studies, the approach used to calculate the beginning of the lunar year and convert the Gregorian year into the Qamariyah year is the calculation system with hishab. In this case, the hisab to determine the beginning of the months of Shawwal, Zulqaedah, and Dhulhijjah in 1444 Hijri undergoes an istiqmal process, so that the number of days is rounded up to 30 days, because the crescent visibility criteria have not reached the determined standard. The hope of this research is to provide a deeper understanding for the government and religious leaders, both those who have experience and those who do not, regarding an accurate and modern way to calculate the beginning of the month as well as the alignment of Gregorian rules with Qamariyah. Additionally, it is hoped that students, particularly those from the Department of Shariah and Law and the astrophysics study programme, will directly participate in disseminating information to the public about the system for calculating the first day of the calendar and the conversion from Gregorian rules to Qamariyah rules.*
Keywords: *Conversion, Gregorian, Qamariyah, Falak science, Hisab Urfi*

Abstract: *Artikel ini menyajikan analisis mengenai penentuan permulaan rembulan juga peralihan dari arah kalender Gregorian hingga kalender Qamariyah melalui tinjauan astronomi islam. Temuan dari studi ini mengisyarakatkan apabila penetapan hari pertama untuk awal kalender memungkinkan dengan dua metode, yakni hisab serta rukyat. Dalam kajian astronomi, pendekatan yang dipakai untuk menghitung permulaan lunar dan mengubah tahun Gregorian ke dalam tahun Qamariyah ialah sistem perhitungan dengan hisab. Dalam hal ini, hisab untuk menentukan awal bulan Syawal, Zulqaedah, dan Dzulhijjah tahun 1444 Hijriyyah mengalami proses istiqmal, sehingga kuantitas hari dibulatkan 30 hari, karena kriteria visibilitas hilal belum mencapai standar dari yang tentukan. Harapan dari penelitian ini adalah menyediakan pemahaman yang lebih mendalam bagi pemerintah dan pemuka agama, baik yang memiliki pengalaman maupun yang belum, mengenai cara akurat dan modern untuk menghitung awal bulan serta penyelerasan aturan Gregorian dengan Qamariyah. Selain itu, diharapkan mahasiswa, khususnya yang berasal dari Departemen Syari'ah dan Hukum serta program studi ilmu falak, turut secara langsung dalam menyebarluaskan informasi bagi khalayak publik mengenai sistem kalkulasi hari pertama untuk awal kalender juga konversi dari aturan Gregorian kepada aturan Qamariyah.*
Keywords: *Konversi, Gregorian, Qamariyah, Ilmu Falak, Hisab Urfi*

A. Introduction

Determining the beginning of the month is often a topic of discussion among the public. There are several questions that often arise regarding the most appropriate and accurate method for calculating the beginning of the month. The process of determining the beginning of the month has a significant function in life, as it can provide insight into seasonal changes or determine the right time to start something new. Often, there are differences regarding the determination of the beginning of the Hijri month related to how to interpret the crescent moon, both from an empirical and socio-psychological perspective. From an empirical point of view, Muslims today seem to have "separated" the mathematical approach to the movement and determination of the position of the moon through calculations based on reliable observation data that can be reproduced in the future, as long as it meets the established requirements.[1]

The determination of days and dates cannot be separated from the guidelines and provisions of the Qur'an and the teachings of the Prophet. The Qur'an provides explanations about the events, characteristics, and functions of objects in space, especially the sun and moon, which can be used as guidelines for determining the beginning and end of times for worship.[2]

The Gregorian calendar, also known as the Gregorian calendar, is a calendar system based on the rotation of the sun with a duration of one year being 365.2422 or approximately 365 days plus an additional 5 hours, 48 minutes, and 46 seconds. The number of days in a Gregorian year varies between 30 and 31 days. As a result, the Gregorian calendar stipulates that a common year has 365 days, while a leap year has an additional day, making it 366 days.

The Hijri calendar is a *lunar*-based calendar system used by the Islamic community for spiritual activities. In this system, a day begins at sunset, and the new moon appears in the western sky after sunset. The Hijri calendar is often referred to as the true Islamic calendar or the *Qamariyah* calendar. According to Alimuddin, an astronomy expert in South Sulawesi, the *Qamariyah* calendar is a method of dating based on the movement of the moon around the earth, with the names of the months known among the Quraish during the prophetic era.[3]

Muslims have determined the beginning of the Hijri month through a number of adjustments in its implementation. During the era of the Prophet Muhammad and his companions, moon observation was used to determine the beginning of the Hijri month. Over time, calculation techniques began to be applied as an alternative. This transformation arose from various interpretations of divine revelation and the words of the Prophet Muhammad developed alongside rapid advances in science. Additionally, advances in astronomy were enhanced through a more structured, critical, and applied approach.[4]

Determining the beginning of the month is a series of interconnected and inseparable processes. However, the implementation of various methods in the Indonesian context has not yet reached an optimal level. The main factor behind this situation is the disagreement between the

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[1]Rahman Subhan Reskiani, Anugrah, *Analytical Study on the Visibility of the Crescent Moon as the Basis for Determining the Beginning of the Islamic Month: Special Observations in Makassar*, 6 (2022), p. 96.

[2]Irfan. Anwar. and Mahyudin Latuconsina, *Comparative Analysis of Criteria for Determining the Beginning of the Kamariah Month: Perspectives of the Fazilet and Mabims Calendars*, 7.1 (2023), pp. 121–36, doi:10.24252/ifk.v7i1.36469.

[3]Nurul Wasilah Wahidin, *Problem of Unification Hijri Calendar*, 4.2 (2022), doi:10.20414/afaq.v4i2.5761.

[4]*Fathur Rahman Basir and Nur Aisyah Nur Aisyah, Genealogical Traces of Bugis Scientific Navigation Traditions: A Historical Study of the Development of Navigation in the Context of Islamic Astronomy*, 1.1 (2020), pp. 90–101, doi:10.24252/hisabuna.v1i1.13115.

government and a number of Islamic community organisations, which tend to support certain methods in determining the beginning of the Hijri month. These differences in perspective have led to disharmony in implementation, especially when determining the beginning of Ramadan and Shawwal, which often results in differing decisions between the government and Indonesian Islamic organisations.

The determination of the beginning of the Hijri month varies due to differences in views regarding arguments related to rukyat and the calculation of the beginning of the Hijri month.[5] In determining time in Islam, there is a field of science known as Falak. The two main types of calendars in Indonesia are hisab and rukyat. There are many madhhabs that support the use of the hisab and rukyat methods as references in determining the beginning of *the Qomariyah* month. In general, there are two main approaches in the practice of determining the new moon in the Hijri calendar system, namely the rukyat method and the hisab method. The rukyat approach is carried out through direct observation of the hilal (crescent moon), while the hisab method uses astronomical calculations based on certain formulas to estimate the possibility of seeing the hilal.[6]

Two interrelated and crucial factors in determining the beginning of the *Qamariyah* month are the roles of hisab and rukyat. While rukyat uses various astronomical instruments to make observations when the sun sets at the end of the day at the end *of the lunar* month to determine whether the crescent moon ( ) has been sighted or not, hisab presents the results of calculations related to the beginning of the month. However, the earth's horizon and weather have an impact on the results of rukyat. Since the Middle Ages, Muslim scientists have created the science of Falak, also known as Islamic Astronomy, which focuses on the sun, moon, earth, and other celestial objects that move in their orbital paths to determine the times of worship for Muslims.[7]

Determining time may seem simple, but in practice it is very challenging because there are often differing views among scholars and large organisations in Indonesia[8] regarding the determination of the beginning of the month. Determining the new month and the transition from the Gregorian to the Hijri calendar is not an easy matter. The process requires high concentration and a variety of data. The calculation method for determining the beginning of the month needs to be introduced to the public so that they can calculate the time accurately and correctly. On the other hand, it is also important to have a procedure for converting years from the Gregorian to the Hijri calendar. This way, the public can recognise and calculate the current year independently.

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[5]Marni Marni and Fatmawati Hilal, *Power and Determination: Exploring Government Authority in Determining the Beginning of the Qomariah Month*, 2.3 (2021), pp. 16–32, doi:10.24252/hisabuna.v2i3.22189.

[6] Nur Afdal Purnama Putra, Andi Muh. Akmal, and Halimah B, *A Scientific Approach to Hilal Observation in the Works of Ibn Rajab Al-Majdī: A Study of the Book Khulāṣah Al-Aqwāl Fī Ma'rifat Al-Waqt Wa Ru'yat Al-Hilāl*, 3.2 (2022), pp. 1–20, doi:10.24252/hisabuna.v3i2.28417.

[7] Wahidin, *Problem of Unification Hijri Calendar,* Al-Afaq: Journal of Astronomy and Astronomy, 4.2 (2022).

[8]Sabriadi HR Wakia, Nurul, *Study on the Evolution and Aspects of Astronomy Curriculum: A Critical Review*, *HISABUNA: Journal of Astronomy,* 2.3 (2021), pp. 195–209, doi:10.24252/hisabuna.v2i3.13079.

B. Method

The researchers used literature-based research techniques in this study, utilising scientific sources such as books, journals, final projects, and other writings relevant to the topic under discussion. Materials relevant to this study were obtained through information gathering techniques, which involved collecting and examining documents. The data collection process was carried out historically, systematically, and based on scientific methods by reviewing, critically examining, and evaluating various scientific literature relevant to the issue. The main focus was on studies discussing the determination of the beginning of the Hijri month and the conversion of the Gregorian calendar to the Hijri calendar through an astronomical approach.

C. Results and Discussion

1. Definition of Astronomy

Astronomy means "orbit" or "trajectory" of celestial bodies, including the sun, moon, stars, and planets, according to its etymology.[9] The Big Indonesian Dictionary (KBBI) defines astronomy as the science that studies the horizon, the curvature of the sky, or the calculation of constellations and the movement of celestial bodies.[10] Thus, the field of science that studies the motion and movement of celestial bodies in their orbits is the main focus of astronomy.[11]

The Babylonian civilisation, which settled in the valley between the Tigris and Euphrates rivers, were the first to understand astronomy around 4,500 years before Christ. They learned how to use the movement of the moon to determine the days and the rotation of the sun to determine the months, years, and dates. Hisab, which translates to "the science of calculation", is another name for astronomy. Many sciences related to calculation, including mathematics, astrology, and inheritance, are included in the Arabic term hisab. In terms of terminology, hisab is synonymous with astronomy.

According to Sulaiman, the science that studies objects in space outside the Earth's atmosphere, including the sun, moon, stars, galaxies, planets, comets, and meteors, as well as their movement, formation, and physical and chemical properties, using principles from mathematics, physics, and biology, is called astronomy. There are two main branches of astronomy:

a. Ilmu Falak Ilmiy (Theoretical): Covers theories and concepts of celestial objects, including cosmogony (origin), cosmology (form and structure), cosmography (quantity), astrometry (measurement and distance), gravitation (motion and attraction), and astrophysics (elemental composition). *Theoretical Astronomy* is the name of this field.
b. Practical Astronomy: This branch of astronomy focuses on determining the location of celestial bodies for useful applications, such as determining prayer times. Commonly

[9] Susiknan Azhari, *Encyclopedia of* II (Pustaka Pelajar, 2008).
[10] Department of Education and Culture, *The Great Dictionary of the Indonesian Language,* IX (Balai Pustaka, 1990).
[11] Abdul Azis Dahlan, *Encyclopedia of Islamic Law,* Volume 1 (PT. Intermasa, 2001).

understood by the general public as astronomy or calculation (hisab), this field is known as practical astronomy.

In Islam, astronomy contributes significantly, particularly in determining prayer times, the direction of the qibla, the start of Ramadan, the celebrations of Eid al-Fitr and Eid al-Adha, including the Hajj pilgrimage and the wukuf ceremony at Arafat. This science supports the accuracy of prayer times and directions through observation and analytical calculations.

2. Calculation Science

Astronomy and hisab share similarities yet have significant differences. Astronomy is practical, prioritising direct observation over complex mathematical calculations. Mathematical calculations in astronomy only serve as a support to ensure the accuracy of determining the beginning of the Hijri month and other worship schedules. Theoretically, astronomy provides simple guidelines for determining the beginning of the month or prayer times through direct observation (rukyat) without sophisticated tools. This approach has been practised since the time of the Prophet Muhammad SAW.[12]

Based on historical records, the Prophet Muhammad SAW determined the beginning of *the Qamariyah* month by directly observing the crescent moon (hilal), not through calculations of hisab or astronomy. At that time, astronomy had not yet developed, and the conditions of society, especially the Bedouin community who lived in remote areas, did not support the use of calculation methods. Information from cities was difficult to reach villages quickly. If the Prophet Muhammad (peace be upon him) had used mathematical calculations to determine the beginning of the month, this would have made it difficult for the Bedouin community, as knowledge of mathematics was generally only possessed by certain groups, such as the Jewish and Christian communities.

In the discipline of astronomy, astronomers use arithmetic principles to perform astronomical calculations. This calculation process is based on the relative geometric positions of celestial objects, especially the earth, moon and sun. The purpose of these calculations includes determining the timing of worship, such as the direction of the qibla, prayer schedules, and the beginning of the month in the Hijri calendar.

a. *Hisab Urfi*

The Hisab urfi method, sometimes referred to as Hisab adadi or Hisab alamah, is a calendar calculation method that relies on the moon's orbit around the Earth, which is determined by agreement. This method is only an estimate and does not always represent the actual phases of the moon. Except for *Dhu al-Hijjah,* which is always 30 days in a leap year, the total number of days in a month in Hisab Urfi fluctuates between 30 and 29 days.

The beginning of the zakat period, date conversion, and the solar month (Gregorian calendar) are all determined using this approach; however, the beginning of the lunar month is not. The 30-

[12] Taufiqurrahman Kurniawan, *Astronomy: Tracing Its Traces and Global Dimensions* (Rancang Grafis, 2010).

year Hijri cycle consists of 11 leap years (355 days) and 19 common years (354 days). According to the Hisab Urfi calculation, which does not take into account the actual location of the moon, except for the month *of Dhu al-Hijjah* in a leap year ( ), which adds 30 days, a year consists of 12 months, with odd-numbered months consisting of 30 days and even-numbered months consisting of 29 days. In accordance with applicable regulations, Hisab Urfi determines the number of days from 1-1-1 Hijriyah to the required date for the *Qamariyah* month, or from 1-1-1 AD for the *Syamsiah* month.

b. Hisab Hakiki

This is a method of calculating the beginning of the *Qomariyah* month based on the position of the moon at sunset. This approach takes into account the actual movements of the moon, earth, and sun, resulting in irregular month lengths. In this system, the number of days in a month can be 29 or 30, either consecutively or alternately, unlike the Hisab Urfi method, which uses a fixed and average pattern.

In its application, hisab hakiki utilises data on the actual movements of the moon and Earth, and uses the principles of spherical trigonometry in its calculations.[13] This method is an astronomical calculation system that has a high degree of accuracy because it is based on the latest dynamic astronomical data and takes correction factors (correction terms) into account very carefully. This method adopts spherical trigonometry formulas and its calculations are based on astronomical tables (Zij). Several classical works that refer to the hisab hakiki method include *Al-Matla' as-Sa'id* and *Manahij al-Hamidiyyah,* both of which are important references in Islamic astronomical calculations. This system is used to determine the position of the crescent moon and the beginning of the Hijri month more precisely, either through the bi at-Tadqiq or bi at-Tahqiq methods, both of which provide different levels of accuracy depending on the complexity of the data and formulas used.[14]

Technological developments have made the transition between the Hijri calendar system, which follows the lunar cycle, and the Gregorian calendar, which refers to the movement of the sun, easier in today's era of computers and the internet. One of the main differences between the Hijri calendar and the Gregorian calendar is that the former refers to the lunar cycle with an average year length of 354 or 355 days, while the latter refers to the solar cycle with 365.25 s per year. Various contemporary software and applications, ranging from astronomy-based tools to simple applications for everyday needs, have been developed to facilitate date conversion between these two systems. In the context of determining the beginning of the Hijri month, the concept *of Ijtima'* is one of the important aspects that influence astronomical calculations. *Ijtima'* itself has several types, such as *ecliptic ijtima', equatorial ijtima',* and *topocentric ijtima',* each of which uses

[13]Ministry of Religious Affairs of the Republic of Indonesia, *Initial Guide to Calculating the Lunar Qamariyah System* (Legal Administration and Religious Court Development, 1983).

[14]Fika Afhamul Fuscha and Ahmad Izzuddin, *Zij Al-Jadid Ibn Asy-Syatir: Exploring the Algorithm for Determining the Beginning of the Hijri Lunar Year*, 5.2 (2023), pp. 237–49, doi:10.20414/afaq.v5i2.7715.

different sky coordinate references in determining the position of the sun and moon. The difference in the use of these coordinate systems has implications for variations in the calculation of *ijtima'* time and the position of the crescent moon in various regions.

In Indonesia, this difference is further complicated by the varying criteria for crescent visibility applied by various Islamic institutions and organisations. Some use the criterion *of imkanur rukyat* (the possibility of seeing the crescent moon). As a result, the conversion between the Gregorian calendar and the Hijri calendar cannot always be used as a definite reference for determining the beginning of the Hijri month. Thus, the discussion of *ijtima'* and these differences in criteria is relevant to support the analysis of the accuracy of the conversion methods in this study.

3. Discussion Results

a. *Hijri to Gregorian Conversion for 1 Shawwal 1446 H*

There are several established stages or techniques for calculating the conversion of dates from Hijri to Gregorian or vice versa.[15] The steps taken in determining the beginning of Ramadan 1446 H/2025 AD, which falls on 31 March, have been validated. The following is the calculation.

Eid al-Fitr 1 Shawwal 1446 H (1 – 10 – 1445)

Description:

1) The time elapsed is: 1445 years, plus 9 months, plus 1 day)
2) Calculation of days elapsed: (1445 + 9 + 1)

Note:

- 1 Gregorian calendar year cycle = 4 years = 1,461 days
- 1 Hijri year cycle = 30 years = 10,631 days

1445/30 = 48 cycles, 5 years

48 cycles × 10,631	= 510,288 days
5 years	= 1,772 days
9 months	= 266 days
1 day	= 1 day +
Total	= **512,327 days**
Gregorian correction (10 + 3)	= 13 days
Difference between Hijri and Gregorian calendars	= 227,016 days +
Number of days that have passed	= **739,356 days**

[15] Nurul Wasilah Wahidin and Muhammad Saleh Ridwan, *Abbas Padil's Academic Contribution to the Development of Astronomy in South Sulawesi: Analysis and Implications,* 2 (2021), p. 23.

3) Day Conversion

First, an understanding of the sequence of days in the Gregorian calendar, as follows:

Table 1. Order of days and markets in the Gregorian calendar

Sequence of Days in the Gregorian Calendar	**Market Sequence in the Gregorian Calendar**
1. Saturday 2. Sunday 3. Monday 4. Tuesday 5. Wednesday 6. Thursday 7. Friday	1. Kliwon 2. Legi 3. Paing 4. Pon 5. Wage

- Determination of Days
  739356/7 = 105622, plus 2 days
  Remaining 2 days = **Sunday**
- Market Determination
  739356/5 = 147871, 1 day more
  Remaining 1 day = **Kliwon**

4) Date, Month, Year Conversion

739,356 days / 1,461 days	= 506 cycles, plus 90 days
506 cycles x 4 years	= 2024 years
Excess of 90 days	= 2 months, 31 days
Therefore, the time that has passed	= 2024 years, 2 months, 31 days

5) Conclusion

Therefore, for the date of 1 Syawal after conversion to the Gregorian calendar, simply add 1 to the year and month. If the number of days remains the same, then 1 Syawal 1446 H corresponds to 31 March 2025 AD (31 – 3 – 2025).

b. *Conversion from Gregorian to Hijri 31 March 2025 AD*

After finding the result of the conversion from Hijri to Gregorian, the author will now calculate the reverse conversion, i.e., from Gregorian to Hijri. Is the result the same or the opposite? The following is a description of the conversion calculation from Gregorian to Hijri. After we obtained the result of the Hijri-Gregorian conversion calculation, which shows that 1 Shawwal 1446 H falls on 31 March 2025 AD, we will now prove it with the reverse calculation, namely the Gregorian-Hijri conversion. The following is a description of the calculation.

Eid al-Fitr on 31 March 2025 CE (31 – 3 – 2025)

Explanation:

1) The time that has passed is: 2024 years, plus 2 months, plus 31 days)
2) Calculation of days elapsed: (2024 + 2 + 31)

   Note:
   - 1 Gregorian calendar cycle = 4 years = 1,461 days
   - 1 Hijri year cycle = 30 years = 10,631 days

   2024/4 = 506 cycles

506 cycles × 1,461 days	= 739,266 days
2 months	= 59 days
31 days	= 31 days +
Total	**= 739,356 days**
Gregorian correction (10 + 3)	= 13 days
Difference between Hijri and Gregorian calendars	= 227,016 days -
Number of days that have passed	= **512,327 days**

3) Date, Month, and Year Conversion

512,327 days/10,631 days	= 48 cycles, plus 2039 days
48 cycles x 30 years	= 1,440 years
Excess days in 2039	= 5 years, 267 days
Surplus of 267 days	= 9 months, 1 day
Number of years	= 1440 + 5 = 1445 years
Thus, the time that has passed	= 1,445 years, 9 months, 1 day

4) Conclusion

   Therefore, for the date 31 March 2025, after conversion, simply add 1 to the year and the month, while the day remains the same. After conversion, the result matches the conversion from Hijri to Gregorian, with the result of from this conversion being 1 Shawwal 1446 H. Therefore, we can conclude that Eid al-Fitr 1446 AH/2025 AD, specifically 1 **Shawwal 1446 AH, falls on 31 March 2025 AD, on Sunday Kliwon.**

Table 2. Duration of Common Years and Leap Years in the Gregorian Calendar

No	Month	Common Year		Leap Year	
		Age	Total	Age	Total
1.	January	31	31 days	31	31 days
2.	February	28	59 days	29	60 days

3.	March	31	90 days	31	91 days
4.	April	30	120 days	30	121 days
5.	May	31	151 days	31	152 days
6.	June	30	181 days	30	182 days
7.	July	31	212 days	31	213 days
8.	August	31	243 days	31	244 days
9.	September	30	273 days	30	274 days
10.	October	31	304 days	31	305 days
11.	November	30	334 days	30	335 days
12.	December	31	365 days	31	366 days

In the Gregorian calendar system, there are two types of years: common years and leap years. The difference between the two lies in the number of days in February. In a common year, February has 28 days, while in a leap year it increases to 29 days.

Table 3. Number of Days in 12 Months

Month	Number of Days	Month	Number of Days
1	30	7	207
2	59	8	236
3	89	9	266
4	118	10	295
5	148	11	325
6	177	12	354

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c. Time of the Last Ijtima' of Ramadan 1446 (30 March 2025)

Formula:

FIB Time (GMT) +(ELM-ALBSB-SM)+ **07:00 WIB**

Notes:

FIB = Fractional Illumination of the Moon (Percentage of the moon's surface illuminated by sunlight as observed from Earth)

ELM = Ecliptic Longitude of the Sun (The position of the Sun's longitude based on the ecliptic coordinate system in astronomy)

ALB = Apparent Longitude of the Moon (The apparent longitude of the Moon as seen from Earth in the astronomical coordinate system, corrected for various observational factors)

SB = Lunar Sabaq (Difference between ALB and the next hour's ALB)

SM = Solar Longitude Difference (The difference between ELM and the next hour's ELM)

For this conjunction calculation, we will take the time on 30 March 2025 AD with the above data obtained from the 2025 ephemeris data of the Ministry of Religious Affairs of the Republic of Indonesia.

Figure 1. Ephemeris Data for 30 March 2025 (Moon and Sun)

30 Maret 2025

DATA MATAHARI

Jam	Ecliptic Longitude *)	Ecliptic Latitude *)	Apparent Right Ascension	Apparent Declination	True Geocentric Distance	Semi Diameter	True Obliquity	Equation Of Time
0	9° 32' 35"	0.08"	8° 45' 48"	3° 46' 44"	0.9986560	16'00.92"	23° 26' 19"	-4 m 31 s
1	9° 35' 03"	0.08"	8° 48' 04"	3° 47' 43"	0.9986679	16'00.91"	23° 26' 19"	-4 m 30 s
2	9° 37' 32"	0.09"	8° 50' 21"	3° 48' 41"	0.9986798	16'00.90"	23° 26' 19"	-4 m 29 s
3	9° 39' 60"	0.09"	8° 52' 38"	3° 49' 39"	0.9986916	16'00.89"	23° 26' 19"	-4 m 28 s
4	9° 42' 28"	0.10"	8° 54' 54"	3° 50' 37"	0.9987035	16'00.88"	23° 26' 19"	-4 m 28 s
5	9° 44' 56"	0.10"	8° 57' 11"	3° 51' 36"	0.9987154	16'00.86"	23° 26' 19"	-4 m 27 s
6	9° 47' 25"	0.11"	8° 59' 28"	3° 52' 34"	0.9987272	16'00.85"	23° 26' 19"	-4 m 26 s
7	9° 49' 53"	0.11"	9° 01' 44"	3° 53' 32"	0.9987391	16'00.84"	23° 26' 19"	-4 m 25 s
8	9° 52' 21"	0.12"	9° 04' 01"	3° 54' 30"	0.9987510	16'00.83"	23° 26' 19"	-4 m 25 s
9	9° 54' 49"	0.12"	9° 06' 18"	3° 55' 29"	0.9987628	16'00.82"	23° 26' 19"	-4 m 24 s
10	9° 57' 18"	0.13"	9° 08' 34"	3° 56' 27"	0.9987747	16'00.81"	23° 26' 19"	-4 m 23 s
11	9° 59' 46"	0.13"	9° 10' 51"	3° 57' 25"	0.9987865	16'00.80"	23° 26' 19"	-4 m 22 s
12	10° 02' 14"	0.14"	9° 13' 08"	3° 58' 23"	0.9987984	16'00.78"	23° 26' 19"	-4 m 22 s
13	10° 04' 42"	0.14"	9° 15' 24"	3° 59' 22"	0.9988102	16'00.77"	23° 26' 19"	-4 m 21 s
14	10° 07' 11"	0.15"	9° 17' 41"	4° 00' 20"	0.9988221	16'00.76"	23° 26' 19"	-4 m 20 s
15	10° 09' 39"	0.15"	9° 19' 58"	4° 01' 18"	0.9988339	16'00.75"	23° 26' 19"	-4 m 19 s
16	10° 12' 07"	0.16"	9° 22' 14"	4° 02' 16"	0.9988458	16'00.74"	23° 26' 19"	-4 m 19 s
17	10° 14' 35"	0.16"	9° 24' 31"	4° 03' 14"	0.9988576	16'00.73"	23° 26' 19"	-4 m 18 s
18	10° 17' 04"	0.17"	9° 26' 48"	4° 04' 12"	0.9988695	16'00.72"	23° 26' 19"	-4 m 17 s
19	10° 19' 32"	0.17"	9° 29' 04"	4° 05' 11"	0.9988813	16'00.70"	23° 26' 19"	-4 m 16 s
20	10° 22' 00"	0.18"	9° 31' 21"	4° 06' 09"	0.9988932	16'00.69"	23° 26' 19"	-4 m 16 s
21	10° 24' 28"	0.18"	9° 33' 38"	4° 07' 07"	0.9989050	16'00.68"	23° 26' 19"	-4 m 15 s
22	10° 26' 57"	0.18"	9° 35' 54"	4° 08' 05"	0.9989168	16'00.67"	23° 26' 19"	-4 m 14 s
23	10° 29' 25"	0.19"	9° 38' 11"	4° 09' 03"	0.9989287	16'00.66"	23° 26' 19"	-4 m 13 s
24	10° 31' 53"	0.19"	9° 40' 28"	4° 10' 01"	0.9989405	16'00.65"	23° 26' 19"	-4 m 13 s

*) for mean equinox of date

DATA BULAN

Jam	Apparent Longitude	Apparent Latitude	Apparent Right Ascension	Apparent Declination	Horizontal Parallax	Semi Diameter	Angle Bright Limb	Fraction Illumination
0	17° 11' 56"	1° 47' 29"	15° 09' 40"	8° 24' 32"	1° 01' 13"	16' 40.97"	234° 19' 28"	0.00472
1	17° 49' 47"	1° 50' 46"	15° 43' 44"	8° 42' 05"	1° 01' 13"	16' 41.01"	234° 56' 49"	0.00544
2	18° 27' 39"	1° 54' 02"	16° 17' 51"	8° 59' 35"	1° 01' 14"	16' 41.05"	235° 30' 09"	0.00623
3	19° 05' 31"	1° 57' 18"	16° 52' 01"	9° 17' 02"	1° 01' 14"	16' 41.08"	236° 0' 12"	0.00706
4	19° 43' 23"	2° 00' 32"	17° 26' 15"	9° 34' 25"	1° 01' 14"	16' 41.09"	236° 27' 36"	0.00795
5	20° 21' 15"	2° 03' 46"	18° 00' 33"	9° 51' 45"	1° 01' 14"	16' 41.10"	236° 52' 47"	0.00889
6	20° 59' 07"	2° 06' 58"	18° 34' 54"	10° 09' 02"	1° 01' 14"	16' 41.10"	237° 16' 07"	0.00989
7	21° 36' 60"	2° 10' 10"	19° 09' 18"	10° 26' 15"	1° 01' 14"	16' 41.09"	237° 37' 55"	0.01093
8	22° 14' 52"	2° 13' 21"	19° 43' 47"	10° 43' 24"	1° 01' 14"	16' 41.07"	237° 58' 25"	0.01203
9	22° 52' 45"	2° 16' 31"	20° 18' 19"	11° 00' 29"	1° 01' 14"	16' 41.05"	238° 17' 49"	0.01318
10	23° 30' 37"	2° 19' 40"	20° 52' 54"	11° 17' 31"	1° 01' 13"	16' 41.01"	238° 36' 17"	0.01439
11	24° 08' 29"	2° 22' 47"	21° 27' 34"	11° 34' 28"	1° 01' 13"	16' 40.96"	238° 53' 57"	0.01564
12	24° 46' 22"	2° 25' 54"	22° 02' 18"	11° 51' 21"	1° 01' 13"	16' 40.91"	239° 10' 55"	0.01695
13	25° 24' 14"	2° 28' 60"	22° 37' 06"	12° 08' 09"	1° 01' 13"	16' 40.84"	239° 27' 19"	0.01831
14	26° 02' 05"	2° 32' 04"	23° 11' 57"	12° 24' 53"	1° 01' 13"	16' 40.77"	239° 43' 12"	0.01972
15	26° 39' 57"	2° 35' 07"	23° 46' 53"	12° 41' 33"	1° 01' 12"	16' 40.69"	239° 58' 39"	0.02118
16	27° 17' 48"	2° 38' 09"	24° 21' 53"	12° 58' 07"	1° 01' 12"	16' 40.59"	240° 13' 44"	0.02269
17	27° 55' 39"	2° 41' 10"	24° 56' 57"	13° 14' 37"	1° 01' 12"	16' 40.49"	240° 28' 31"	0.02426
18	28° 33' 30"	2° 44' 10"	25° 32' 05"	13° 31' 01"	1° 01' 11"	16' 40.38"	240° 43' 01"	0.02587
19	29° 11' 20"	2° 47' 09"	26° 07' 17"	13° 47' 21"	1° 01' 11"	16' 40.27"	240° 57' 18"	0.02753
20	29° 49' 09"	2° 50' 06"	26° 42' 34"	14° 03' 35"	1° 01' 10"	16' 40.14"	241° 11' 23"	0.02925
21	30° 26' 58"	2° 53' 02"	27° 17' 55"	14° 19' 43"	1° 01' 10"	16' 40.00"	241° 25' 19"	0.03101
22	31° 04' 47"	2° 55' 56"	27° 53' 21"	14° 35' 46"	1° 01' 09"	16' 39.86"	241° 39' 08"	0.03282
23	31° 42' 32"	2° 58' 49"	28° 28' 48"	14° 51' 43"	1° 01' 09"	16' 39.70"	241° 52' 48"	0.03468
24	32° 20' 20"	3° 01' 41"	29° 04' 23"	15° 07' 34"	1° 01' 08"	16' 39.54"	242° 6' 25"	0.03659

The following is the calculation breakdown:
Given:

1. The smallest ELM in March (30th)	= 0.00472	= 00:00 GMT
2. ELM at 00:00 GMT		= 9˚32’35”
3. ALB at 00:00 GMT		= 17˚11’56”
4.Sunrise (SM)	= ELM 01:00 – ELM 00:00	= 0˚2’28.00”
	= 9˚35’03” - 9˚32’35”	
5. Lunar Sabaq (LS)	= ALB 01:00 – ALB 00:00	= 0˚37’51.00”
	= 17˚49’47” - 17˚11’56”	

Calculation of Ijtima' Time:
Enter the following formula: **FIB Time (GMT) +**(ELM-ALB ÷ SB-SM) + **07:00 WIB**
= 00:00 +(9˚32′35" - 17˚11′56"0˚37′51.00" - 0˚2′28.00") + 07:00
= 00:00 +(-7˚39′21.00"0˚35′23.00") + 07.00
= 00:00 + (-12˚58’55.56”) + 07.00
= -5°58'55.56"
= 5:58:55.56 WIB

Based on the calculation results, the end of Ramadan 1446 AH occurs on 30 March 2025 AD at 5:58:55 WIB. Astronomically, this time marks the conjunction between the sun and the moon as a scientific indicator of the change of month. However, according to Islamic law, the beginning of the month of Shawwal is not only determined by the occurrence *of the conjunction,* but also by the possibility of seeing the crescent moon after sunset (*imkanur rukyat).* If the crescent moon does not meet the visibility criteria, then the month *of Ramadan* is completed to 30 days, and the beginning of the month *of Shawwal* begins the next day, which is 31 March 20205 AD.

D. Conclusion

Based on the results of the study entitled Implementation of the Method for Determining the Beginning of the Month and Conversion of the Date of Eid al-Fitr 2025 AD/1446 AH, it can be concluded that the process of converting Eid al-Fitr 1446 AH/2025 AD in this study utilises two calculation approaches, namely calculations based on hisab urfi and hisab hakiki. Hisab urfi is used as the basis for determining the beginning of the month in the Syamsiyyah (Gregorian) calendar, where the principle of ijtima' urfi is used as a reference to determine the average length of each month. Meanwhile, hisab hakiki is a more accurate method because it is based on the actual position and movement of the moon, earth, and sun. Unlike hisab urfi, which is fixed, in the hisab hakiki system, the length of the month can vary, sometimes two consecutive months are 29 days or 30 days long, and sometimes they alternate as in the hisab urfi calculation pattern.

The results of this research indicate that Eid al-Fitr 1446 AH/2025 AD will fall on 31 March 2025 AD on Sunday Kliwon, with the ijtima' or the end of Ramadan occurring on 30 March 2025 at 5:59:55.56 WIB. This means that on the night of 30 March, it will have already transitioned to

1 Shawwal 1446 H, and on that night, the Takbir call can be sounded as a sign that Eid al-Fitr has arrived.

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