

## APP:



# Sky Prayers

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**E** Everyone

**i** This app is compatible with your device.

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## Definitions

To determine the exact time period for each prayer, we need to determine nine points of time per a day. These times are defined in the following table:

Time	Definition
<b>Fajr</b>	When the sky begins to lighten (dawn).
<b>Sunrise</b>	The time at which the first part of the Sun appears above the horizon.
<b>Dhuhr</b>	When the Sun begins to decline after reaching its highest point in the sky.
<b>Asr</b>	The time when the length of any object's shadow reaches a factor (usually 1 or 2) of the length of the object itself plus the length of that object's shadow at noon.
<b>Sunset</b>	The time at which the Sun disappears below the horizon.
<b>Maghrib</b>	Soon after sunset.
<b>Isha</b>	The time at which darkness falls and there is no scattered light in the sky.

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## Higher Latitudes

In locations at higher latitude, twilight may persist throughout the night during some months of the year. In these abnormal periods, for the determination of Fajr and Isha several solutions have been proposed, three of which are described below.

**Middle of the Night:** In this method, the period from sunset to sunrise is divided into two halves. The first half is considered to be the "night" and the other half as "day break". Fajr and Isha in this method are assumed to be at mid-night during the abnormal periods.

**One-Seventh of the Night:** In this method, the period between sunset and sunrise is divided into seven parts. Isha begins after the first one-seventh part, and Fajr is at the beginning of the seventh part.

**Angle-Based Method:** This is an intermediate solution, used by some recent prayer time calculators. Let  $\alpha$  be the twilight angle for Isha, and let  $t = \alpha/60$ . The period between sunset and sunrise is divided into  $t$  parts. Isha begins after the first part. For example, if the twilight angle for Isha is 15, then Isha begins at the end of the first quarter (15/60) of the night. Time for Fajr is calculated similarly.

Fajr & Isha are calculated by others using different criteria, all over the world. Some use 15°, 18°, or even 20°. Others use 75 minutes or 90 minutes criteria (as in Saudi and Indo-Pak). These criteria fail to calculate Fajr & Isha at high latitudes.

Above 48.5° (e.g., Vancouver, Canada), the sun does not go 18° below horizon on the longest day of the year.

Above 51.5° (e.g., Cambridge, UK), the sun does not go 15° below horizon on the longest day of the year. On other days, Isha calculated at 15° will give Isha time 2.5 hours after Maghrib. This becomes hardship.

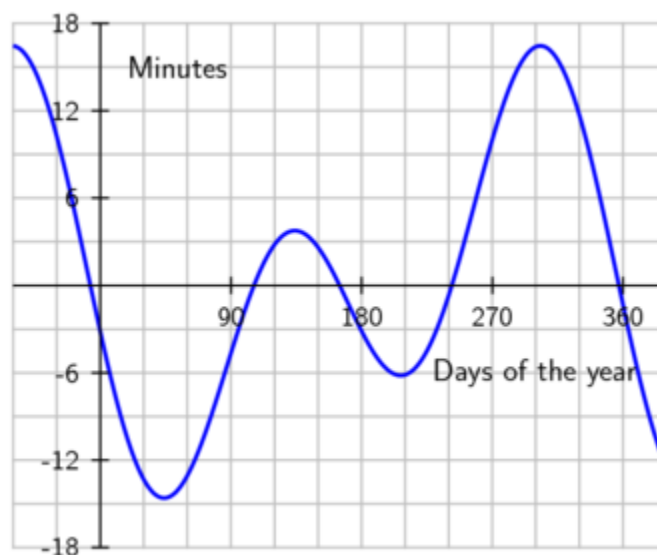
Above 54.5° (e.g., Copenhagen, Denmark), the sun does not go 12° below horizon on the longest day of the year. On other days, Isha calculated at 12° will give Isha time 3 hours after Maghrib. This is even more hardship, so it is impractical.

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## Astronomical Measures

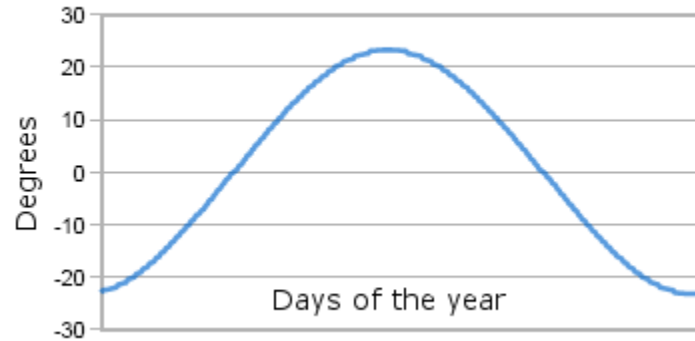
There are two astronomical measures that are essential for computing prayer times. These two measures are the equation of time and the declination of the Sun.

The equation of time is the difference between time as read from a sundial and a clock. It results from an apparent irregular movement of the Sun caused by a combination of the obliquity of the Earth's rotation axis and the eccentricity of its orbit. The sundial can be ahead (fast) by as much as 16 min 33 s (around November 3) or fall behind by as much as 14 min 6 s (around February 12), as shown in the following graph:



The Equation of Time (Ref)

The declination of the Sun is the angle between the rays of the sun and the plane of the earth equator. The declination of the Sun changes continuously throughout the year. This is a consequence of the Earth's tilt, i.e. the difference in its rotational and revolutionary axes.



**The Declination of Sun**

The above two astronomical measures can be obtained accurately from The Star Almanac, or can be calculated approximately. The following algorithm from U.S. Naval Observatory computes the Sun's angular coordinates to an accuracy of about 1 arcminute within two centuries of 2000.

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## **Shari'ah Compliant Calculations for Fajr & Isha:**

1. Observations of Subh-Sadiq and disappearance of Shafaq at various locations on earth have confirmed that it is not right to calculate Fajr & Isha, assuming any fixed degree (whether 18° or 15°) or any fixed minutes (like 90 minutes or 75 minutes). Although, 18° is correct at equator, it is not correct to use that for every latitude, specially for higher latitudes. Research and observations by Moonsighting.com members have confirmed that 18° should be used for every day at equator, but not for all latitudes.
2. Muslims have consensus to follow the natural phenomena of Subh Sadiq and the end of Shafaq for determining the time for Fajr & Isha. In the 19th and 20th century, Muslims calculated Fajr & Isha prayer times using astronomical twilight (sun being 18° below horizon) from Tables prepared by Greenwich or U.S. Naval Observatories. With the advent of computers, Muslims were able to calculate Fajr & Isha at 15°, 17°, 18° etc. The confusion still exists, though several international seminars tried to solve the issue of Fajr & Isha. For instance, in the last few years Ulamaa' in England have switched from 18° to 15° or 12° or even 9°.
3. The Qur'an and the Sunnah did not fix any degrees of the sun's depression for these prayers. For Fajr, Qur'an 2:187 says, "Eat and drink until the white thread of dawn appear to you distinct from its black thread; then complete your fast till the night appears." The Sunnah guideline for Fajr is in (Bukhari, Abu-Daud, Ibn-Majah, Tirmizi): The Messenger (SAW) prayed Fajr on one day when the dawn appeared in the sky ... and the next day delayed it until the ground was very bright. This shows that there is a great leeway for praying Fajr. For Isha, Qur'an 11:114 "Establish prayer in the two ends of the day, and at approaches of night." The Sunnah guideline for Isha is disappearance of Shafaq. There was a disagreement among earliest Fuqaha' about definition of Shafaq (Shafaq Ahmer or Shafaq Abyad -- redness or whiteness).
4. Moonsighting.com collected observations for Subh Sadiq and disappearance of Shafaq from many places in the world [e.g., Riyadh (Saudi Arabia), Karachi and Tando Adam (Pakistan),

Durban (South Africa), Auckland (New Zealand), Sydney NSW (Australia), Miami FL (USA), Washington DC (USA), Toronto (Canada), High Wycombe (UK), Dewsbury (UK), and Blackburn (UK)]. These observations show that no fixed degrees can be used for Fajr & Isha. A decade long research by Moonsighting.com found that the Subh-Sadiq and Shafaq are functions of latitude and seasons (day number of the solar year). All collected observations from different latitudes were plotted against day number of the year. With curve-fit technique, moonsighting.com came up with a function of latitude and seasons for Fajr & Isha. Therefore we use these functions. For Fajr, Subh Sadiq, that is considered as (Fajr-al-Mustatir of Ahadith) when morning light in the sky spreads horizontally, is used. For Isha, Imam Shafi'i, Imam Maalik, Imam Ahmad bin Hanbal, and two prominent pupils of Imam Abu-Hanifa (Imam Abu-Yusuf and Imam Muhammad) all preferred Shafaq Ahmer. Only Imam Abu-Hanifa preferred Shafaq Abyad.

Moonsighting.com uses Shafaq Ahmer in summer when nights are short and Shafaq Abyad in winter, when days are short. However, Shafaq General is chosen to avoid hardship at higher latitudes, when Shafaq Abyad becomes too late in summer. Shafaq General uses Shafaq Abyad in Summer and Shafaq Ahmer in Winter. Transition from Abyad to Ahmer is used in Spring and Ahmer to Abyad in Fall. These formulas are good up to the 55° latitude.

5. The conclusions of the research by Moonsighting.com can be stated as follows:
  - From equator to 55°, the 18° depression angle calculations are compared with the values given by the functions of latitude and seasons and most favorable values are used, which means; For Fajr, the later of the two and for Isha the earlier of the two. This comparison is done to remove the out-liars of observations because on some days 18° calculation gives later Fajr time than observed time (function of latitude and seasons) so later time is used. Similarly, on some days 18° calculation gives earlier Isha time than observed time so earlier time is used for Isha. We originally used Subh-Sadiq as a little bit earlier than Fajr-al-Mustatir of Ahadith just as a precaution. but recently, after collecting more and more observations from USA and Europe, we believe and started using the spread of light horizontally (We call it "Tabayyun") as Subh-Sadiq.
  - At higher latitudes where Fajr and Isha times are very close to each other, such as at latitudes between 55° and 60°, the rule of Sab'u Lail (1/7th of the night), is used because other methods give times that become hardship for those areas. This has been permitted by Hakim ul Ummat Ashraf Ali Thanwi from India (Imadatul Fatawa, vol 2, p98, 12/12/1322 Hijri) and also by Allamah Shami in Durre Mukhtar. Mufti Shafi Usmani from Pakistan said: "This statement is presented via assumption, that in those countries where Subah Sadiq cannot be clearly distinguished (e.g., Northern Europe in the summer months) it is permissible to act upon this advice". Therefore, two things are calculated for Fajr; one is Subh Sadiq and the other is last 1/7th of the night. Fajr time is later of the two. Similarly, two things are calculated for Isha; one is disappearance of Shafaq and the other is first 1/7th of the night. Isha time is earlier of the two.
  - At latitudes more than 60°, hardship prevails and at latitudes more than 65°, the sun does not set/rise for a number of days every year. All Muslim scholars agree that whenever there is perpetual day or perpetual night for 24 hours or more, the prayer times during the affected days should be approximated. This is because the Messenger (SAW) said: "There will come a time when there will be a day like a year, a day like a month, and a day like a week..." The people asked him (SAW) if during the day like a year, should they offer each prayer only once. He (SAW) replied: "You should approximate the times" [Sahih Muslim]. Therefore, for such situations, a suggestion by Fuqaha' is to calculate on the basis of "Aqrabul-Ayyam" or "Aqrabul-Bilad". Some Fuqaha' suggest to use Makkah times for all five prayers. Another jurisprudence (Fatwa) by Dar al-Ifta, stipulated by

Sheikh Mohammed Rashid Ridha, citing Sheikh Mohammed Abdou, the former Grand Mufti of Egypt dated 08/08/2010 is as follows:

- Any location where the duration of fasting exceeds 18 hours or is less than 6 hours should refer itself to the times valid for the closest "balanced" location in order to determine the moment of breaking the fast. It is certainly not logical, nor sensible nor reasonable to "jump" from 18 hours to 14 hours and 54 minutes - the longest day in Makkah.

An example of such a location is Hammerfest, Norway, a town of 7000 inhabitants, claiming to be the northernmost town in the world. The Muslim population of Norway is about 300,000 and that of Hammerfest is around 250. Hammerfest is situated at 70.65° N and 23.68° E. In this locality, the sun does not set or does not rise in the height of summer and in the midst of winter. The accepted rule of "Aqrabul-Bilad", using the closest latitude where the signs and times of salah are easily distinguishable, still gives fasting times of more than 23 hours in summer and less than 3 hours in winter. Thus it becomes necessary to use the jurisprudence established by Dar al-Ifta as explained above.

Now take Oslo (latitude = about 60°) and using the rule of Sab'u Lail, we calculate the longest day to be 19 hours 38 minutes and the shortest day to be 7 hours and 43 minutes. Of course, we are beyond the 18 hour limit fixed by the Fatwa, but since the inhabitants of Oslo seem to admit to these timings without difficulty, we will retain 60° as the latitude based on "Aqrabul-Bilad" concept.

Therefore, at latitudes more than 60°, we slide down to 60° and calculate Fajr & Isha using the rule of Sab'u Lail in summer. This will thus respect both the jurisprudence and the practices of Muslims in cities around 60 degrees latitude. In winter, we use research by Moonsighting.com for Subh-Sadiq and Shafaq as functions of latitude and seasons (day number of the solar year). These functions were derived after collecting observations from different latitudes (mentioned above). For Fajr, Subh Sadiq, that is considered as (Fajr-al-Mustatir of Ahadith) when morning light in the sky spreads horizontally, is used. For Isha, Moonsighting.com uses Shafaq Ahmer in summer when nights are short and Shafaq Abyad in winter, when days are short. This is chosen to avoid hardship at higher latitudes, when Shafaq Abyad becomes too late in summer. Transition from Abyad to Ahmer is used in Spring and Fall seasons.

6. Moonsighting.com has received many Emails from its users regarding the objections for fixed degrees versus latitude and seasons based formulae.
7. Here is an E-mail from Abdelkader Tayebi of Windsor, Canada, confirming the time of observation for Shafaq Ahmer, that matched with Moonsighting.com calculations:

“On Tuesday May 19, 2009, I, Abdelkader was in St Joseph MI for business. I observed that Maghrib was at 9:05 and Isha with complete disappearance of shafaq ahmar was around 10:15. The disappearance process is not accurate to the minute and takes time to fully take place, it may be subject to the interpretation of the observer, a near disappearance started around 10:04 (shades of red on top of darkness), then around 10:11 there were only traces of dark red and by 10:15 it was more pronounced and the only left was the white shafaq, the same was noticed yesterday. So your calculations using a function of latitude and seasons are mashaAllah quite accurate. I will continue observing whenever I have chance inshAllah.”

**Question: How about the method employed by Saudi Arabia for Isha' which, to my knowledge, is 1-1/2 hour after Maghrib all year long? Isn't that disregarding the change in sun's declination?**

Answer: For latitudes close to Equator, like Saudi Arabia, India, Pakistan, 1-1/2 hours is a good approximation and also practical, and the variation of twilight time (due to sun's angle of depression) is small in different seasons. The Isha' time on some days begins earlier than 1.5 hours, but there is nothing wrong in starting prayers after 1.5 hours. So, this practice of 1.5 hours is a matter of convenience and of course is within Shari'ah guidelines. Haramain (Makkah & Madinah) in Saudi Arabia use the following:

**Fajr**      **18.5°**  
**Shurooq** **1 minute before sunrise**  
**Zuhr**      **Zawaal = Calculated Noon**  
**Asr**      **Hanbali (Shafi'i)**  
**Maghrib** **1 minute after sunset**  
**Isha**      **90 minutes after Maghrib**

**Question: I was very surprised to see a wide difference in timing for Fajr & Isha calculated by assumptions of various organizations. Can you explain?**

Answer: Fajr & Isha are calculated by different organizations using different criteria, all over the world. Some use 17°, 19°, 20°, or even 21°. Others use 90 minutes, 75 minutes or 60 minutes criteria. These criteria fail to calculate Fajr & Isha at high latitudes. Muslims have resorted to some easy solution of choosing specific degrees, but that is not right. Remember, in the times of Prophet (SAV), there were no watches. Much more variations were in practice, even to the extent that Sahaabah (RA) prayed Fajr in Ghalas (darkness of night mixed with light) or Isfaar (when the light has spread conspicuously). This variation was more than half an hour. Qur'an mentions Fajr time as when you can differentiate a black thread from a white thread. Some Sahabi (RA) was observed to physically take two threads and trying to see them; the Prophet (SAV) clarified to him (RA) that this is not the intent of Shari'ah. It is when the very faint light of morning begins to spread horizontally in the darkness of night. Moonsighting.com has been doing research for the calculation methods and after a continuous effort of more than a decade, we are in a position to calculate Fajr and Isha based on actual observations at different latitudes in different seasons. This method meets the intent of the Shari'ah, and we should not be alarmed with differences of even 15 minutes.

**Question: Islamicfinder.org gives an option for ISNA prayer Schedule. If that is ISNA's official position, then why moonsighting.com gives a different prayer schedule compared to Islamicfinder.org's ISNA option?**

Answer: Islamicfinder.org has used ISNA's name without verifying from ISNA. ISNA never had any official position. Islamicfinder.org is wrong and at fault to use ISNA's name and that ISNA uses 15°. Use of 15° or 18° is not correct. Read more about How We Calculate on <http://moonsighting.com/how->

[we.html](#) Moonsighting.com offers what we believe is the more towards reality and that does not use any fixed degrees nor any fixed interval from Maghrib. It uses a complex formula based on latitudes and seasons.

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**Question: How long does it take to disappear Shafaq Ahmer (red), and how long for Shafaq Abyadh (white)?**

Answer: There is no one fixed answer. Firstly, red Shafaq is greatly affected by humidity in the atmosphere. At different latitudes, shafaq (both red and white) disappear in different time interval from Maghrib every day. Secondly, in different seasons, shafaq (both red and white) disappear in different time interval from the same location. You can verify that if you do the "Mushahidah" (observation) in different seasons.

**Question: What is the relationship of disappearance of Shafaq Ahmer (red), and disappearance of Shafaq Abyadh (white) with degrees?**

Answer: There is no fixed relationship in terms of degrees. Observations from different parts of the world prove that. Moonsighting.com has collected observations done by scholars and other volunteers in many places in the world [Riyadh (S. Arabia), Tando Adam (Pakistan), Cape Town (S. Africa), New Zealand, Buffalo (New York), Toronto (Canada), Sydney, Australia, Phoenix, Arizona, and Trinidad] for few days in a year. More observations were done in Blackburn, Lancashire, England (from September 1987 to August 1988) by a group of Ulamaa'. Although these observations were not for 365 days of the year, but covered almost entire year with a few months missing.

All collected observations show that for areas at or near equator Shafaq disappearance and Subh-Sadiq occurs at 18° every day of the year, and it translates into 75 minutes in all seasons. As you move to other latitudes, subh-Sadiq and disappearance of Shafaq occurs at different degrees in different seasons. Subh-Sadiq at higher latitudes (like Blackburn) is observed at 94 to 122 minutes (14.6° to 10.6 degrees) in different seasons. Red Shafaq disappears at 66 to 105 minutes (12° to 9.7°) at higher latitudes in different seasons. A decade long research by Moonsighting.com found that the Subh-Sadiq and Shafaq are functions of latitude and seasons. Moonsighting.com uses these functions of latitude and seasons for calculating Fajr and Isha times.