

NATIONAL UNIVERSITY OF SINGAPORE



GEK 1506

Heavenly Mathematics: Cultural Astronomy

Prepared especially for Associate Professor Helmer Aslaksen



Project

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Matriculation Number

U059112E
U047761B
U059214B
U046406U
U059208B

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"I am the Primal Point from which have been generated all created things start. I am the Countenance of God Whose splendor can never be obscured, the Light of God Whose radiance can never fade." --- the Báb

Preface

The Bahá'í faith is one of the world's ten largest international religious bodies. (Major Religions of the World) It has famous religious followers such as Cathy Freeman, gold medal-winning runner and star of 2000 Summer Olympics in Sydney, Australia. However, it being a relatively new faith with its origins in 1844 and with only about 7 million followers in the world, the Bahá'í Faith remains fairly unknown in Singapore. Seizing this opportunity, our group has decided to dedicate our GEK 1506 project to this faith, with particular emphasis on its interesting calendar. Along the way, you will be briefly introduced to the faith and its origins. Most importantly, we will be presenting to you an in depth dissection of the Bahá'í calendar. We will also touch on the faith's fascination with the numbers 19 and 9, and make comparisons between the Gregorian, Chinese and Islamic calendar to allow a better feel of the calendar.



A nice picture of Uncle Wei and Auntie Lili

Much effort has been put into ensuring that we present the Bahá'í faith and its calendar as accurately as possible. Special thanks has to be given to Uncle Wei and his wife Auntie Lili of the Spiritual Assembly of the Bahá'ís of Singapore¹, who kindly agreed to talk to us about the Bahá'í faith

¹ 110-D Wishart Road Singapore 098733

and cleared any doubts we had about the faith and the calendar. It has been a truly enriching experience for us and we have learnt so much.

In addition, apart from the usual wordy project, we have also included a handy Bahá'í calendar for the year 2005/2006, B.E. 162 as well as a simple C program which allows you to convert Bahá'í dates to Gregorian dates. (± 1 day accuracy ☺) All proudly designed by our group and we can assure you that you can never find a duplicate of these items anywhere!



The Spiritual Assembly of the Bahá'ís of Singapore

“O thou who art the first to believe in Me! Verily I say, I am the Báb, the Gate of God, and thou art the Bábu'l-Báb, the gate of that Gate.” --- the Báb

Overview of the religion

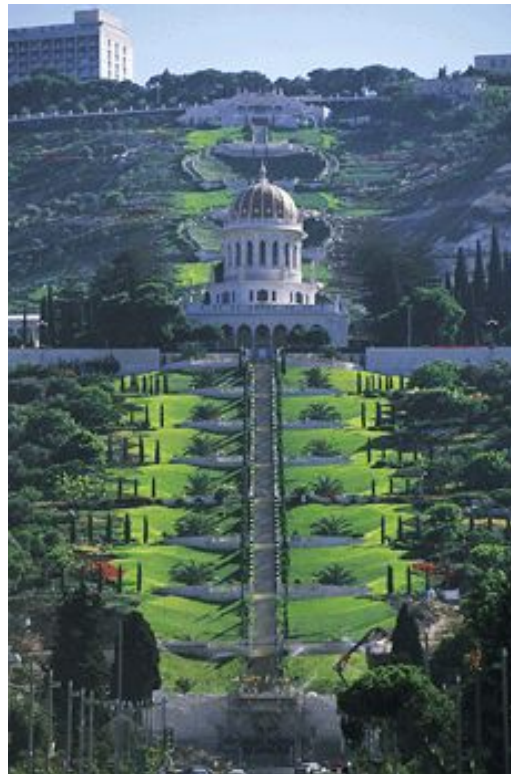


Artist impression of Siyyid Muhammad Ali Shírází (c. 1845)

The Bahá'í Faith had its beginnings in 23 May 1844. It was the year when a young Iranian merchant proclaimed the advent of a new religious revelation. He became known as "the Báb," which means "the Gate" in Arabic. Born on October 20, 1819, the Báb's given name was Siyyid `Ali-Muhammad. He declared that his purpose was to prepare humanity for the advent of a new messenger from God.

The Báb and his followers, who were called Bábis, were brutally persecuted by the clergy and government of Iran, who viewed the Báb's claim as heretical. The Báb was arrested, beaten and imprisoned, and on July 9, 1850, he was executed publicly by firing squad in the city of Tabriz. Over the years, more than 20,000 Bábis perished in a series of massacres throughout Iran when they refused to recant their faith.

Among the Báb's followers was a young man named Mirza Husayn-`Ali, who was born in Tíhran on November 12, 1817. Known today as Bahá'u'lláh, which means "The Glory of God," he was a member of one of the great patrician families of Iran.



The Shrine of the Báb

Source: <http://www.deepgraysea.com/bahaiworldcenter.htm>

In becoming a follower of the Báb, Bahá'u'lláh turned his back on wealth and privilege, and, like other followers, became the victim of cruel persecution. Because of his family's influential position, Bahá'u'lláh escaped death, but he was imprisoned in a notorious dungeon in Tihran in 1852. After four months in chains, he was exiled to Baghdad. There, in 1863, Bahá'u'lláh openly declared his mission as a messenger of God--the Promised One as foretold by the Báb. The followers of Bahá'u'lláh became to be known as Bahá'ís.



Image of Bahá'u'lláh

*Courtesy of
<http://www.geocities.com/shoghiinstitute/bahaullah.jpg>*

In making this claim, Bahá'u'lláh explained that all of the world's great religions have foretold a day when peace and justice would be established worldwide. The past messengers of God--such as Abraham, Krishna, Moses, Zoroaster, Buddha, Christ, Muhammad and the Báb--consciously prepared humanity for this day. For Bahá'ís, Bahá'u'lláh's appearance fulfills the promise of all the world's scriptures.

Because of the continuing opposition of the Iranian government and religious authorities, Bahá'u'lláh suffered a series of exiles following His declaration. As a prisoner of the Ottoman Empire, He was sent from Baghdad to Constantinople, then to Adrianople, and finally to the prison city of `Akka, in the Holy Land.

In 1867, while in Adrianople, Bahá'u'lláh began writing a series of letters to the kings, rulers and religious leaders of His time, addressing them both as individuals and collectively. In these letters, Bahá'u'lláh announced his mission. He told of the dawning of a new age and warned of coming revolutions and changes in the world's political and social order. Bahá'u'lláh proclaimed the need for humanity to accept new principles. He called for general efforts at disarmament, for example, and urged the world's rulers to band together into a

commonwealth of nations, saying that only by acting collectively to ban war could lasting peace be established.

Towards the end of his life, even though still under sentence of exile and prison, Bahá'u'lláh was allowed to move outside of the city walls to an abandoned estate known as Bahji. In this spot, on May 29, 1892, Bahá'u'lláh passed away. Bahá'u'lláh's body is enshrined at Bahjí, which is a place of pilgrimage for Bahá'ís.



The Mansion of Bahjí – Shrine of Bahá'u'lláh

Image courtesy of <http://www.deepgraysea.com/bahaiworldcenter.htm>

“O wayward generation! Had you believed in Me every one of you would have followed the example of this youth, who stood in rank above most of you, and would have willingly sacrificed himself in My path. The day will come when you will have recognized Me; that day I shall have ceased to be with you.”

--- the Báb

Reason for new calendar

In every major religion, and the ensuing civilization it spawns, there will be the creation of a new and unique calendar, which organizes and charts the activities of its adherents during the year. It is no different for the Bahá'í faith.

The Báb signaled the importance of the dispensation which he came to herald by inaugurating a new calendar. He felt that the new age of unity should have a new calendar free from the objections and associations which made each of the older calendars unacceptable to large sections of the world's population. He also felt that it did not make sense to name months and days after ancient deities, rather, it would only be sensible to name them after the attributes of one true God.



*Image of Bahá'í Lotus Temple
Image courtesy of <http://www.triniview.com>*

Origins of the Bahá'í calendar

The Bahá'í calendar's origins date back to the Ministry of the Báb (1844-1850). The Báb declared that the Bábí' calendar should be solar as in the Gregorian calendar and was to consist of 19 months of 19 days, (each named after a certain attribute of the one true God) with certain intercalary days. The New Year, like the ancient Persian New Year, was to be astronomically fixed, commencing at the Vernal Equinox² (21 March).

Essentially, the Bahá'í calendar is the Badi' calendar with a few rectifications by Bahá'u'lláh himself. Contrary to popular belief, it actually began in the year 1844, the year of the Declaration of the Báb³ and not in 1954 when Bahá'u'lláh departed from Baghdad to Constantinople. Bahá'u'lláh was the one who proclaimed that the start of the Bahá'í calendar would be the year in which the Báb declared that a new Manifestation of God would shortly appear.

Bahá'u'lláh also ordained that the vernal Equinox, the day of the Naw-Rúz, be regarded as the New Year's Day of the Badi' calendar. Thus, the Naw-Rúz of 1855⁴ is considered as the first Naw-Rúz of the Badi' Calendar and 21 March 1844 - 20 March 1845 is considered as the first year of the Bahá'í Era (B.E.)

The Bahá'ís begin their new day at sunset. While we were hoping for some significant reason for this, there was none that we could find, and leaving us no choice but to accept that it just followed the Middle Eastern culture, which was predominantly Islamic who start their days in the evening, albeit at a slightly different timing.

² Although the Vernal Equinox is not fixed on the 21st of March every year, it was decided that it was to be so. This is to ensure that the Bahá'í calendar is "locked" to the Gregorian calendar. Without this, the calendar could vary by a day or two when compared to the Gregorian calendar.

³ This happened in the evening of 22 May 1844/5 Jumada al-Ula 1260, 2 hours and 11 minutes after sunset.

⁴ The immediate Naw-Rúz following the year of the Declaration of the Báb.

Structure of the Bahá'í calendar

The Bahá'í calendar is a solar calendar based on the 19 year cycle 1844-1863 of the Báb, with days beginning and ending at sunset. A year is divided into nineteen months consisting of nineteen days each. The Bahá'í year begins at sunset on the day of the spring (vernal) equinox. Bahá'í years, months and days of the week are named after attributes of God.

The Bahá'í years are also named in a 19 year cycle, called *Vahid*, meaning “unity” and having a numerological value of 19 in Arabic letters:

<u>Year</u>	<u>Arabic Name</u>	<u>Translation</u>
1 st Year	Alif	A
2 nd Year	Bá'	B
3 rd Year	Ab	Father
4 th Year	Dál	D
5 th Year	Báb	Gate
6 th Year	Váv	V
7 th Year	Abad	Eternity
8 th Year	Jád	Generosity
9 th Year	Bahá	Splendour
10 th Year	Hubb	Love
11 th Year	Bahháj	Delightful
12 th Year	Javáb	Answer

13 th Year	Ahad	Single
14 th Year	Vahháb	Bountiful
15 th Year	Vidád	Affection
16 th Year	Badí'	Beginning
17 th Year	Bahí	Luminous
18 th Year	Abhá	Most Luminous
19 th Year	Váhid	Unity

There is also a 361 year major cycle, called *Kull-i-Shay'* (the name has the numerological value $361=19^2$ in Arabic.)

The Bahá'í week begins on Saturday (Gregorian) just like the Persian calendar.

The nineteen months in the Bahá'í year are:

<u>Month</u>	<u>Arabic Name</u>	<u>Translation</u>	<u>First Days</u>
1st Month	Bahá	Splendour	March 21
2 nd Month	Jalál	Glory	April 9
3rd Month	Jamál	Beauty	April 28
4th Month	'Azamat	Grandeur	May 17
5th Month	Núr	Light	June 5
6th Month	Rahmat	Mercy	June 24
7th Month	Kalimát	Words	July 13
8th Month	Kamál	Perfection	August 1

9th Month	Asmá'	Names	August 20
10 th Month	'Izzat	Might	September 8
11 th Month	Mash <u>h</u> iyat	Will	September 27
12 th Month	'Ilm	Knowledge	October 16
13 th Month	Qudrat	Power	November 4
14 th Month	Qawl	Speech	November 23
15 th Month	Masá'il	Questions	December 12
16 th Month	<u>S</u> haraf	Honour	December 31
17 th Month	Sultán	Sovereignty	January 19
18 th Month 1	Mulk	Dominion	February 7
19 th Month	'Alá'	Loftiness	March 2

Since $19 \times 19 = 361$

And $365 - 361 = 4$

In order to complete the three hundred and sixty-five day cycle in the year (including changes associated with leap years) there are four intercalary days from February 26th to March 1st inclusive, preceding the last Bahá'í month, which is a fasting month. The Intercalary Days, called *Ayyam-i-Ha*, are not considered part of any month. These days are spent doing acts of charity, gift giving, hospitality, and preparing for the fast.

The days of the week are:

<u>Day</u>	<u>Arabic Name</u>	<u>Translation</u>
Saturday	Jalál	Glory
Sunday	Jamál	Beauty
Monday	Kamál	Perfection
Tuesday	Fidál	Grace
Wednesday	'Idál	Justice
Thursday	Istijlál	Majesty
Friday	Istiqalál	Independence

Holy Days:

During the year there are nine Holy Days during which Bahá'í's cease work.

These days mark the key anniversaries of the **Central Figures** of the Faith. The

Bahá'í Holy Days are:

Naw Rúz (New Year's Day)	March 21
1st Day of Ridván	April 21
9th Day of Ridván	April 29
12th Day of Ridván	May 2
Declaration of The Báb	May 23
Ascension of Bahá'u'lláh	May 29
Martyrdom of The Báb	July 9
The Birth of the Báb	October 20
The Birth of Bahá'u'lláh	November 12

2. Declaration of Bahá'u'lláh in the Garden of Ridván (Paradise).

In addition to the above Holy Days, there are two days that are considered Holy Days on which work is not suspended. These days are:

The Day of The Covenant November 26

The Passing of 'Abdu'l Bahá November 28

Naw-Rúz, March 21

New Year's Day, celebrated in Persia for thousands of years.

First Day of Ridván, April 21

The Festival of Ridván is a 12-day period commemorating Bahá'u'lláh's declaration of His mission on the eve of His departure from Baghdad for Constantinople in 1863. This day in particular commemorates His arrival in the Najíbiyyih Garden, where His declaration took place. Local and National Spiritual Assemblies are elected on this day. Commemorations of this day should be held at about 3:00 P.M. Work should be suspended on this day.

Ninth Day of Ridván, April 29

This day commemorates the arrival of members of Bahá'u'lláh's family in the Najíbiyyih Garden. Work should be suspended on this day.

Twelfth Day of Ridván, May 2

This day commemorates the departure of Bahá'u'lláh for Constantinople and brings to a close the Festival of Ridván. Work should be suspended on this day.

The Declaration of the Báb, May 23

The Báb declared His mission to Mulla Husayn on this day in 1844, marking the inception of the Bahá'í era. Commemorations should be held at about two hours after sunset. Work should be suspended on this day.

The Ascension of Bahá'u'lláh, May 29

Bahá'u'lláh passed from this life on this date in 1892. Commemorations should be held at 3:00 A.M. Work should be suspended on this day.

The Martyrdom of the Báb, July 9

The Báb was executed by firing squad on this date in 1850. Commemorations should be held at noon. Work should be suspended on this day.

The Birth of the Báb, October 20

This date commemorates the birth of the Báb in 1819. Work should be suspended on this day.

The Birth of Bahá'u'lláh, November 12

This date commemorates the birth of Bahá'u'lláh in 1817. Work should be suspended on this day.

The Day of the Covenant, November 26

'Abdu'l-Bahá did not permit the celebration of His birthday, as it falls on May 23, the same day as the Declaration of the Báb. However, after receiving numerous requests, He designated this day for the Bahá'ís to celebrate His life. Work is not suspended on this day.

The Ascension of 'Abdu'l-Bahá, November 28

This day commemorates the passing of 'Abdu'l-Bahá on this day in 1921. Commemorations should be held at 1:00 A.M. Work is not suspended on this day.

What's the deal with the numbers 19 and 9?

From the Islamic perspective (which the Bahá'í faith links its origins to), the significance of 19 as a mystical representation of physical creation and of divine "revelation" is not based upon some superstitious magical notion. The entire Qur'an is believed to be enfolded in the first chapter of that book. That first chapter is likewise believed to be contained in the first verse. The first verse - bismi'llah al-rahman al-rahim "In the Name of God, the Beneficent, the Merciful!" - is composed of 19 letters in Arabic. That first verse is believed to be contained in the letter "B" at the beginning of the verse, and that letter "B" is believed to be contained in the dot or point beneath the letter. The mystical significance is that the initial "B", the "19 letters of the first verse", the first chapter, and the entire Qur'an were generated from the first point.

In the realm of physical creation, the universe began from a single point, generating all the galaxies, stars, solar systems and living organisms. In the realm of spiritual creation, the unknowable divine reality we term God, created a first will from which all things were created; the embodiments of that divine will are the inspired personages known as Messengers, Prophets or Manifestations of God, who generate holy books and civilizations, transforming societies according to new principles.

The Báb (the "Gate", 1819-1850), was titled "the Primal Point," in honor of that point from which the universe and the Qur'an were generated. This illustrates the Bahá'í principle of the harmony of true science and true religion perfectly well. It accords with scientific understanding, and it has a powerful symbolic significance in religious terms.

However, ultimately, the number 19 is the numerical value of the word "ONE" in all the scriptural languages, Aramaic, Hebrew, and Arabic. The number 19,

therefore proclaims the First commandment in all the scriptures - that there is only ONE God.

As for the number 9, its' significance comes from several places. Primarily, the Arabic alphabet can be used to represent numbers. All their words have a numerical value attached to it. Interestingly, the numerical value of Bahá⁵ is 9. Bahá'u'lláh has also often referred to Bahá'ís in his writings as "the people of Bahá".

The use of the number 9 is also often believed by many non-Bahá'ís, and some Bahá'ís, to stand for 9 Manifestations of God. In fact, its significance is that 9 is the highest single digit in the decimal system, and thus is seen by Bahá'ís to "contain" all the other digits. It is a useful metaphor for universality and unity.

Now, much has been mentioned about the numerical values attached to Arabic alphabets and we have decided to include a little portion to introduce you to the world of amazing Arabic Numerology.

The Abjad numerals are a numeral system which was used in the Arabic-speaking world prior to the use of the so-called Arabic numerals (which are actually of Indian origin). In the Abjad system the letters of the arabic alphabet are assigned numerical values. Thus in principle the system is similar to the Roman numerals - however the details are rather different. In the past these numbers were used by mathematicians. In modern use they are primarily used for numbering small quantities, such as items in a list. They are also used to assign numerical values to Arabic words for purposes of numerology. The word abjad derives from the first four letters in an archaic ordering of the letters.

⁵ Root word of Bahá'u'lláh and Ya Bahá'ul'Abha.

Below is a table detailing the numerology of the Arabic alphabets:

ā' ا	1	y/ī ي	10	q ق	100
b ب	2	k ك	20	r ر	200
j ج	3	l ل	30	sh ش	300
d د	4	m م	40	t ت	400
h ه	5	n ن	50	th ث	500
w/ū و	6	s س	60	kh خ	600
z ز	7	`ع	70	dh ذ	700
H ح	8	f ف	80	D ض	800
T ط	9	S ص	90	Z ظ	900
				gh غ	1000

Example: The word *Bahá* (بأهأ) would have a nominal value of $2 + 1 + 5 + 1 = 9$

However, a few of the numerical values would be different when the alternative order of the abjad is used. But we will not discuss them in this paper.

Calendar date conversion

Bahá'í to Gregorian

Given a Bahá'í date, in terms of Kull-i-Shay' (Major), Vahid (Cycle), Year, Month and Day, there are ways to convert to Gregorian date. The following is one of the ways, through the calculation of Rata Die (R.D.) of the date. Rata Die is the number of days dating from 1st January of the first year of the Gregorian calendar.

Gregorian Date: Day (D) / Month (M) / Year (Y).

Bahá'í Date: | Major | Cycle | Year | Month | Day |

Calculating the equivalent Gregorian year

The first step is the calculation of the equivalent Gregorian year. We do this by counting how many years have elapsed since the start or the epoch of the Bahá'í calendar in 1844. This is done using the following formula:

Equivalent Gregorian Year (Y) = $361 \times (\text{Major}) + 19 \times (\text{Cycle}) + \text{Year} - 1 + 1844$

Recall that 1 Kull-i-Shay' (Major) consist of 361 years, while 1 Vahid (Cycle) consist of 19 years. 1844 is added at the end because it is the year of the epoch, day 1 of year 1 of the Bahá'í Era – March 21, 1844 which is R.D 673,222.

Calculating the Rata Die (R.D.) of the Bahá'í date

Next, calculate the R.D. of 20th March of the equivalent Gregorian year (Y) using the formula:

$$\begin{aligned} \text{R.D. of (20/3/Y)} &= 365 \times (Y - 1) \\ &+ \text{integer value of } (Y - 1)/4 - \text{integer value of } (Y - 1)/100 \\ &+ \text{integer value of } (Y - 1)/400 \\ &+ 80 \text{ (or 79 if Y is leap year)} \end{aligned}$$

Note: 20th March is the last day of the Bahá'í year, as 21st March is the start of a new year. The formula takes into account leap years and the days lost due to the implementation of the Gregorian calendar in 1582.

Next, get the R.D for the Bahá'í date using the formula:

$$\begin{aligned} \text{R.D. of Bahá'í date} &= \text{R.D. of (20/3/Y)} \\ &+ \left. \begin{array}{ll} 342 & \text{if the Bahá'í month is ayyam-i-ha} \\ 347 & \text{if it is in the 19th Bahá'í month} \\ & \text{and falls on a leap year, } Y=y+1. \\ 346 & \text{if it is in the 19th Bahá'í month} \\ 19 \times (\text{Month} - 1) & \text{if otherwise} \end{array} \right\} \\ &+ \text{Bahá'í day} \end{aligned}$$

Using the R.D of the last day of the previous Bahá'í year, we add the number of additional days by taking into account the mechanics of the calendar to give us the R.D of the Bahá'í date.

Calculating the Gregorian date (Inverse Rata Die⁶)

We can now proceed to convert the R.D of the Bahá'í date in terms of the Gregorian calendar dates.

Let $Z = \text{R.D. of the Bahá'í date} + 306$.

Let $G = Z - 0.25$.

Let $A = \text{integer value of } (G \text{ divided by } 36524.25)$.

Let $B = A - \text{integer value of } (A \text{ divided by } 4)$.

Let $C = \text{integer value of } (B + Z - [\text{year } Y \text{ multiply by } 365.25])$

Month (M) = integer value of $([C \times 5 + 456] \text{ divided by } 153)$

Day (D) = $C - \text{integer value of } ([153 \times M - 457] \text{ divided by } 5)$

The month (M) is greater than 12, for example 15, we will subtract 12 from it to get the required month.

The date of the Gregorian calendar on a given Bahá'í date will thus be Day (D) / Month (M) / Equivalent Gregorian Year (Y).

Example to illustrate:

To illustrate, take "Kamal (Monday), the day of Qudrat (the thirteenth), of the month of Jalal(the second), of the year Bahhaj(the eleventh), of the fifth Vahid,of the first Kull-i-Shay, of the Bahá'í Era.

Accordingly,

Major = 1, Cycle = 5, Bahá'í Year = 11, Bahá'í Month = 2, Bahá'í Day = 13.

⁶ Formula as given in **Peter's Baum's Inverse Rata Die Algorithms**
<http://vsg.cape.com/~pbaum/date/inrata.htm>

$$\begin{aligned} \text{Equivalent Gregorian Year (Y)} &= 361 \times (1-1) + 19(5-1) + 11 - 1 + 1844 \\ &= 1930 \end{aligned}$$

$$\begin{aligned} \text{R.D. of (20/3/1930)} &= 365 \times (1930 - 1) + \text{int} (1930 - 1)/4 \\ &\quad - \text{int} (1930 - 1)/100 + \text{int} (1930 - 1)/400 \\ &\quad + 80 \\ &= 704,632 \end{aligned}$$

$$\begin{aligned} \text{R.D. of Bahá'í date} &= \text{R.D. of (20/3/Y)} + 19 \times (2 - 1) + 13 \\ &= 704,664 \end{aligned}$$

With the R.D of the Bahá'í date, we can now proceed to convert it to Gregorian dates.

$$Z = 704,664 + 306 = 704,970$$

$$G = 704,970 - 0.25 = 704,969.75$$

$$A = \text{int} (704,969.75 / 36524.25) = 19$$

$$B = 19 - \text{int} (19/4) = 15$$

$$C = \text{int} (15 + 704,970 - (1930 \times 365.25)) = 52$$

$$\text{Month (M)} = \text{int} ([52 \times 5 + 456] / 153) = 4$$

$$\text{Day (D)} = 52 - \text{int} ([153 \times 4 - 457] / 5) = 21$$

Since month (M) is <12, we leave it alone. The date of the Gregorian calendar on a given Bahá'í date will thus be 21/4/1930. A check against the Bahá'í calendar will confirm the result.

Calendar Date Conversion

Bahá'í to Gregorian

Finding the Bahá'í date from a given Gregorian date is slightly more tedious.

Finding the number of Elapsed years

First, we find the number of year that has elapsed since the epoch of the Bahá'í calendar, taking into consideration whether the day is before or after the Bahá'í New Year (21st March). We then use the result to calculate the major and minor cycles and year of the Bahá'í date.

Gregorian Date: Day (D) / Month (M) / Year (Y).

Bahá'í Date: | Major (Maj) | Cycle (Cyc) | Year (Yr) | Month (Mth) | Day(Dy) |

Number of elapsed years,

$$\text{EYear} = \text{Year (Y)} - 1844 + \left. \begin{array}{l} - 1 \quad \text{if date is before 20 March of the same year} \\ 0 \quad \text{otherwise} \end{array} \right\}$$

Evaluating the Major, Cycle and Year of the Bahá'í Calendar

Major (Maj) = integer value of (EYear divided by 361) + 1

Cycle (Cyc) = integer value of ([EYear modulo 361] divided by 19) + 1

Year (Yr) = (EYear modulo 19) + 1

Calculating the number of Remaining Days

Now, we will calculate the days remaining and figure out the Bahá'í month and day. Not forgetting that special consideration has to be given to the intercalary days and the last month of the Bahá'í year.

Remaining Days,

$$\text{rDays} = \text{R.D of the Gregorian date} - \text{R.D of the first day of the first month of the Bahá'í major, cycle and year as equated above}$$

Formulae for calculating R.D can be found from the previous section on the conversion from Bahá'í to Gregorian.

Evaluating the Month and Day of the Bahá'í Calendar

$$\text{Month (Mth)} = \left\{ \begin{array}{l} 19 \quad \text{if R.D of the Gregorian date is **greater than** R.D of the 1st day of the 19th month of the Bahá'í major (Maj), cycle (Cyc) and year (Yr).} \\ \text{**ayyam-i-haif** R.D of the Gregorian date is **greater than** R.D of the 1st day of the month of **ayyam-i-ha** of the Bahá'í major(Maj), cycle (Cyc) and year (Yr).} \\ \text{Integer value of (rDays divided by 19) + 1 if otherwise} \end{array} \right.$$

$$\text{Day (Dy)} = \text{R.D of Gregorian date} + 1 - \text{R.D of the 1st day of the month (Mth) of the Bahá'í major (Maj), cycle (Cyc) and year (Yr).}$$

Combining results to find out the Bahá'í date

Hence, given the Gregorian Date [Day (D) / Month (M) / Year (Y)], we are able to find out the Bahá'í date in terms of Major (Maj), Cycle (Cyc), Year (Yr), Month (Mth), Day (Dy).

Example to illustrate:

Using the Gregorian date from the previous example, 21st April 1930, the above conversion should give us the Bahá'í date of the 13th Day, 2nd Month, 11th Year, 5th Cycle, 1st Major.

$$\text{Elapsed year} = 1930 - 1844 + 0 = 86$$

$$\text{Major} = \text{int} (86 / 361) + 1 = 1$$

$$\text{Cycle} = \text{int} [(86 \text{ MOD } 361) / 9] + 1 = 5$$

$$\text{Year} = (86 \text{ MOD } 19) + 1 = 11$$

$$\text{Remaining Days} = 704664 - 704633 = 31$$

$$\text{Month} = \text{int} (31 / 19) + 1 = 2$$

$$\text{Day} = 704664 + 1 - (704633 + 19) = 13$$

We get the Bahá'í date of 13th Day, 2nd Month, 11th Year, 5th Cycle, 1st Major as expected.

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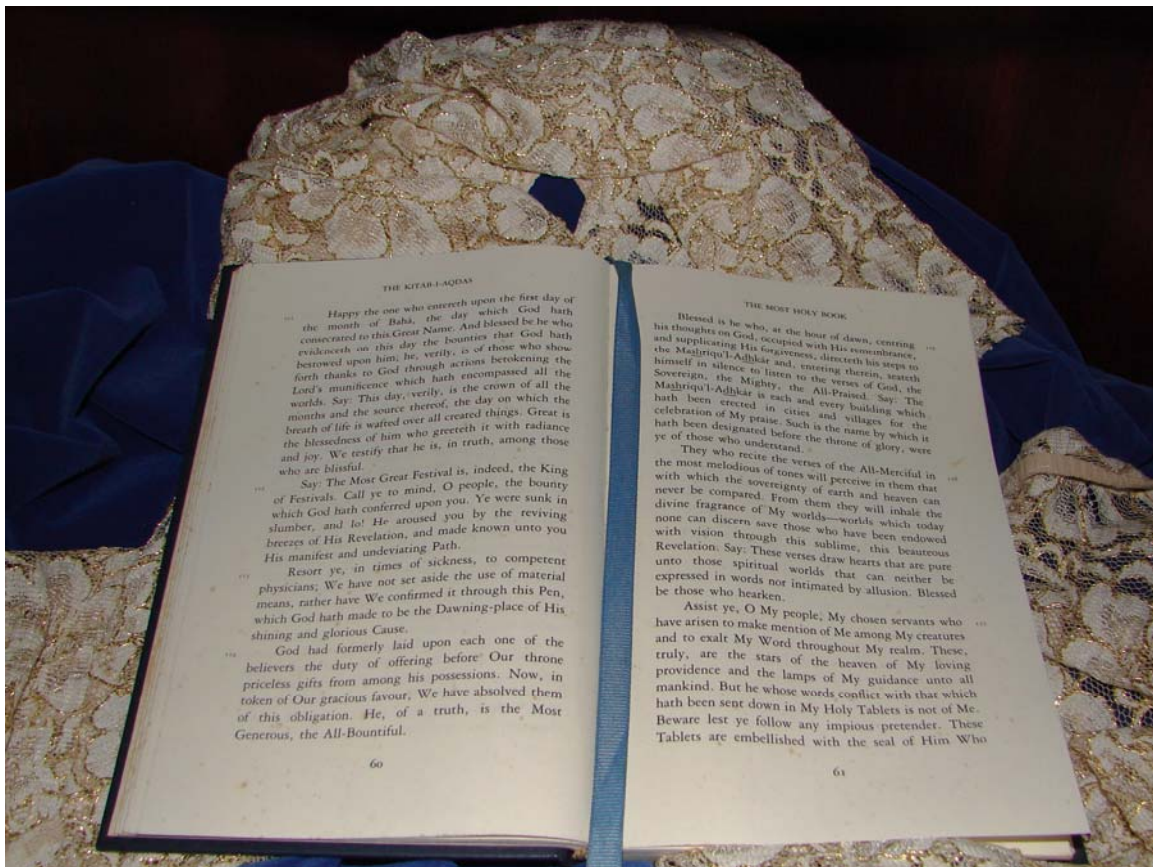
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