

Computing the Vietnamese lunar calendar

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CN	T2	T3	T4	T5	T6	T7		
			1 13/9	2 14	3 15	4 16		
5 17	6 18	7 19	8 20	9 21	10 22	11 23		
12 24	13 25	14 26	15 27	16 28	17 29	18 1/10		
19 2	20 3	21 4	22 5	23 6	24 7	25 8		
26 9	27 10	28 11	29 12	30 13				

Vietnamese calendar rules

The Vietnamese calendar is a kind of astronomical calendar. It can be calculated for any arbitrary year based on the motion of the Sun, the Earth and the Moon. To be able to compute it for any time frame you basically need to compute 2 things:

- any New Moon, and
- the Principal Terms (trung khi') of any year

New Moon is a time the Sun, the Moon and the Earth are on the same line (ho[^].i die[^].n). It occurs once every about 29.5 days.

The 12 Principal Terms (also called Major Terms) are points that divide the ecliptic (ddu+o+`ng hoa`ng dda.o) into equal sectors. Four of them are also used as seasonal markers in Western calendar: March equinox (Xua[^]n pha[^]n, around 20/3), June solstice (Ha. chi', around 22/6), September equinox (Thu pha[^]n, around 23/9), and December solstice (Ddo[^]ng chi', around 22/12).

The New Moon are used to determine when the lunar months begin and end. The Principal Terms are used to determine the leap months (intercalary months, tha'ng nhua[^].n) and the names of the lunar months. Because they are based on solar positions, the Vietnamese calendar is not a pure lunar one, but a *lunisolar* calendar (a[^]m du+o+ng li.ch).

Once the New Moons and Major Terms are calculated, the following rules can be applied to determine the months and dates. The rules are adapted from the [Explanatory Supplement to the Astronomical Almanac](#), P. Kenneth Seidelmann, editor:

1. The first day of the month is the day on which the New Moon occurs.
2. An ordinary year has twelve lunar months; an intercalary year has thirteen lunar months.
3. The Winter Solstice always falls in month 11.
4. In an intercalary year, a month in which there is no Principal Term is the intercalary month. It is assigned the number of the preceding month, with the further designation of intercalary. If two months of an intercalary year contain no Principal Term, only the first such month after the Winter Solstice is considered intercalary.
5. Calculations are based on the meridian 105° East.

How to apply the rules

There are quite a few computer programs to compute New Moons and Principal Terms with high precision (see [Links](#) for some pointers). Once you have the New Moons, you know when the lunar months start and end. The first day of the lunar month (mu`ng mo[^].t) is the one containing the New Moon. However, here you need to be careful to consider the correct time zone. It is the reason why the Vietnamese and the Chinese calendars differ on many occasions. For example, if you have New Moon at yyyy-02-18 16:24:45 GMT, then the first day of the Vietnamese lunar month is yyyy-02-18, because 16:24:45 GMT is 23:24:45 Hanoi time of

the same day. The Chinese lunar month however begins on the following day, because the day in China begins a bit earlier, so that the New Moon (at yyyy-02-19 00:24:45 Beijing time) is contained in yyyy-02-19.

After having the start/end dates of the lunar months you can determine their names and the leap months as follows. The Winter Solstice (Đông chí) always falls in month 11 of the lunar year. So we need to compute 2 New Moons preceding two consecutive Winter Solstices. If there are 12 lunar months between them then we are done: just number the months 11, 12, 1, 2, ... starting at the month containing the first Winter Solstice.

Matters are a bit more complicated when there are 13 lunar months between the lunar months containing the two Winter Solstices. Then we have a leap year (năm nhuận) and need to find out what the leap month is. Here is the rule for doing it: the first lunar month after the first Winter Solstice that does not contain a Principal Term is the leap month. After finding the leap month you give the months the names 11, 12, 1, ..., M, M leap, M+1, ...

Example: lunar calendar for 1984

Let us apply the above rules to determine the lunar dates of the Vietnamese calendar for the year 1984 based on the following table.

Event	GMT time	Hanoi time	Beijing time
New Moon	04/12/1983 12:25:49	04/12/1983	04/12/1983
Principal Term	22/12/1983 10:29:41	22/12/1983	22/12/1983
New Moon	03/01/1984 05:15:34	03/01/1984	03/01/1984
Principal Term	20/01/1984 21:04:50	21/01/1984	21/01/1984
New Moon	01/02/1984 23:46:20	02/02/1984	02/02/1984
Principal Term	19/02/1984 11:15:53	19/02/1984	19/02/1984
New Moon	02/03/1984 18:30:51	03/03/1984	03/03/1984
Principal Term	20/03/1984 10:23:48	20/03/1984	20/03/1984
New Moon	01/04/1984 12:09:34	01/04/1984	01/04/1984
Principal Term	19/04/1984 21:37:38	20/04/1984	20/04/1984
New Moon	01/05/1984 03:45:21	01/05/1984	01/05/1984
Principal Term	20/05/1984 20:57:28	21/05/1984	21/05/1984
New Moon	30/05/1984 16:47:52	30/05/1984	31/05/1984
Principal Term	21/06/1984 05:02:21	21/06/1984	21/06/1984
New Moon	29/06/1984 03:18:24	29/06/1984	29/06/1984
Principal Term	22/07/1984 15:58:22	22/07/1984	22/07/1984
New Moon	28/07/1984 11:51:08	28/07/1984	28/07/1984
Principal Term	22/08/1984 23:00:20	23/08/1984	23/08/1984
New Moon	26/08/1984 19:25:21	27/08/1984	27/08/1984
Principal Term	22/09/1984 20:32:55	23/09/1984	23/09/1984
New Moon	25/09/1984 03:10:31	25/09/1984	25/09/1984
Principal Term	23/10/1984 05:45:27	23/10/1984	23/10/1984
New Moon	24/10/1984 12:08:13	24/10/1984	24/10/1984
Principal Term	22/11/1984 03:10:24	22/11/1984	22/11/1984
New Moon	22/11/1984 22:56:45	23/11/1984	23/11/1984
Principal Term	21/12/1984 16:22:42	21/12/1984	22/12/1984

New Moon	22/12/1984 11:46:36	22/12/1984	22/12/1984
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According to the rules, month 11 of a lunar year begins on the day of the New Moon before or on the day of the Winter Solstice and ends on the day before the first New Moon after it. So, month 11 of the lunar year 1983 last from 04/12/1983 to 02/01/1984 and month 11 of the lunar year 1984 last from 23/11/1984 to 21/12/1984.

Between 03/01/1984 (begin of the first month after lunar month 11 of 1983) and 21/12/1984 (end of lunar month 11/1984) there are 12 lunar months. Therefore, 1984 is not a leap year of the Vietnamese calendar, and the month names are straightforward: month 12 from 03/01/1984 to 01/02/1984, month 1 from 02/02/1984 to 02/03/1984 etc.

Why 1985 has a leap lunar month?

The situation is different in 1985. Month 11 of the lunar year 1985 last from 12/12/1985 to 09/01/1986. Between the months 11 of 1984 (from 23/11/1984 to 21/12/1984) and 1985 there are 13 lunar months, so 1985 is a leap year. The month from 21/03/1985 to 19/04/1985 does not contain a Principal Term and is therefore the leap month.

Event	GMT time	Hanoi time	Beijing time
New Moon	22/11/1984 22:56:45	23/11/1984	23/11/1984
Principal Term	21/12/1984 16:22:42	21/12/1984	22/12/1984
New Moon	22/12/1984 11:46:36	22/12/1984	22/12/1984
Principal Term	20/01/1985 02:57:34	20/01/1985	20/01/1985
New Moon	21/01/1985 02:28:16	21/01/1985	21/01/1985
Principal Term	18/02/1985 17:07:26	18/02/1985	19/02/1985
New Moon	19/02/1985 18:42:38	20/02/1985	20/02/1985
Principal Term	20/03/1985 16:13:38	20/03/1985	21/03/1985
New Moon	21/03/1985 11:58:36	21/03/1985	21/03/1985
Principal Term	20/04/1985 03:25:25	20/04/1985	20/04/1985
New Moon	20/04/1985 05:22:00	20/04/1985	20/04/1985
New Moon	19/05/1985 21:41:12	20/05/1985	20/05/1985
Principal Term	21/05/1985 02:42:34	21/05/1985	21/05/1985
New Moon	18/06/1985 11:57:55	18/06/1985	18/06/1985
Principal Term	21/06/1985 10:43:55	21/06/1985	21/06/1985
New Moon	17/07/1985 23:56:18	18/07/1985	18/07/1985
Principal Term	22/07/1985 21:36:11	23/07/1985	23/07/1985
New Moon	16/08/1985 10:05:26	16/08/1985	16/08/1985
Principal Term	23/08/1985 04:35:24	23/08/1985	23/08/1985
New Moon	14/09/1985 19:19:45	15/09/1985	15/09/1985
Principal Term	23/09/1985 02:07:19	23/09/1985	23/09/1985
New Moon	14/10/1985 04:33:12	14/10/1985	14/10/1985
Principal Term	23/10/1985 11:21:42	23/10/1985	23/10/1985
New Moon	12/11/1985 14:20:20	12/11/1985	12/11/1985
Principal Term	22/11/1985 08:50:30	22/11/1985	22/11/1985
New Moon	12/12/1985 00:54:24	12/12/1985	12/12/1985

Principal Term	21/12/1985 22:07:30	22/12/1985	22/12/1985
New Moon	10/01/1986 12:21:38	10/01/1986	10/01/1986

Comparison with Chinese calendar

1985 is one of the few years where Vietnamese and Chinese calendars differ significantly: the Vietnamese New Year was 1 month earlier than the Chinese one. The reason can be detected from the above table. The Winter Solstice 1984 falls on 21/12/1984 Hanoi time, but on 22/12/1984 Beijing time, the same day as the New Moon. The month 11 of the Chinese year must contain the Winter Solstice, so it is not the month from 23/11/1984 to 21/12/1984 like in the Vietnamese calendar, but the one starting 22/12/1984. Consequently, the subsequent months (12, 1,...) also start about one month later than the corresponding months of the Vietnamese calendar. While New Year in Vietnam falls on 21/01/1985, it is on 20/02/1985 in China. The two calendars agree again after a leap month is inserted to the Vietnamese calendar (month from 21/03/1985 to 19/04/1985, as seen above). Also, in year 1984 the Chinese lunar month from 23/11/1984 to 21/12/1984 is the first lunar month after Winter Solstice 1983 that does not contain a Major Term and is therefore a leap month.

In the 21st century there are 3 years where the Lunar New Year begins at different dates in Vietnam and in China. In 2007 the Vietnamese New Year is on 17/02/2007, the Chinese one on 18/02/2007. In 2030 the dates are 02/02/2030 and 03/02/2030, and in 2053 they are 18/02/2053 and 19/02/2053.

Links

- [Thuật toán tính âm lịch](#) (Algorithms for computing lunar calendar, in Vietnamese)
- Detailed information on many calendar systems and algorithms for computing them can be found in the book [Calendrical Calculations](#) by Edward M. Reingold and Nachum Dershowitz
- Helmer Aslaksen has written some papers on [The Mathematics of the Chinese Calendar](#).
- [LuniSolarCalendar.java](#) - A small Java program (300 lines) for converting between Gregorian and Vietnamese luni-solar calendar
- Và i ba i tie^ng Vie^t: [Li.ch ta, li.ch Ta`u va` su+. kha'c bie^t](#) của Doan Hung, [Ba Loa.i Li.ch ddang lu+u ha`nh](#), của Tran Thuong Thu. (Need UTF-8 capable browser). The rules mentioned may be out of date.

[Ho Ngoc Duc <duc@informatik.uni-leipzig.de>](mailto:duc@informatik.uni-leipzig.de)