

The Maya Calendar System

Using their knowledge of astronomy and mathematics, the Maya developed one of the most accurate calendar systems in human history. The Maya calendar system has its roots in older, **Mesoamerican**¹ indigenous civilizations, particularly the **Olmec**.



The Maya calendar is complex and serves both practical and ceremonial purposes. The Maya calendar system includes several calendars that measure time periods of varying lengths. These calendars are based on solar, lunar, planetary, and human cycles. There are three most commonly known cyclical calendars used by the Maya. These include the Haab which is a 365-day solar calendar, the Tzolk'in which is a 260-day sacred calendar, and the Calendar Round of 52 years. In addition, the Maya developed the Long Count calendar to date mythical and historical events chronologically.

A contemporary representation of the Tzolk'in (inner green circle) and Haab (outer brown circle) calendars.

The Haab

The Maya solar calendar, called Haab, is a count of 365 days and thus approximates the **solar year**. The word “haab” means “year” in the **Yucatec Mayan** language. The Haab is composed of 18 months made of 20 days each, plus one month made of 5 days. A month made of 20 days is called a **uinal**. Each uinal has its own name. These 18 months together equal 360 days. The last month made of 5 days is called Wayeb. The 19 months together total 365 days.

$$18 \times 20 + 5 = 365$$

¹ Definitions for words in red-colored font can be found in the Glossary page in the Resources section of the “Living Maya Time” website.

Table 1 shows the Yucatec Mayan names for the Haab months. The 20 days are counted from 0 to 19. The 19th month is the Wayeb. This last month of 5 days is counted from 0 to 4.

The Maya farmers of the Yucatan follow the Haab calendar. The farmers conduct offerings and ceremonies on the same months every year. These ceremonies are the **Sac Ha'**, **Cha'a Chac** and **Wajikol**. The farmers ask for rain and make offerings during the growth cycle of the corn, especially during its planting and harvesting. The Maya in the highlands of Guatemala perform special ceremonies and rituals during the Haab month of Wayeb, the short month of five days.

Table 1: Haab Months and Days

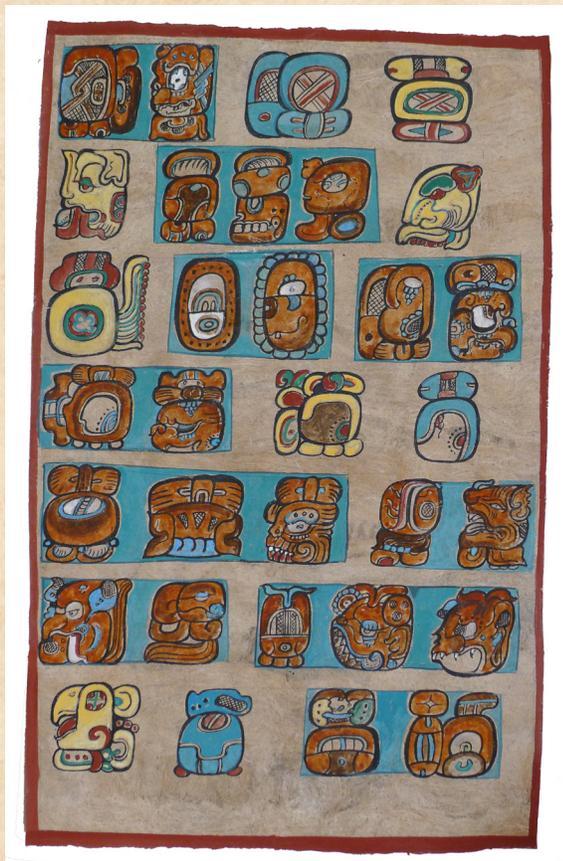
Pop	Wo'	Sip	Sotz'	Sek	Xul	Yaxk'in	Mol	Ch'en	Yax	Sak'	Keh	Mak	K'ank'in	Muwan	Pax	K'ayab	Kumk'u	Wayeb
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	
11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	
12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	
13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	
14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14	
15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	
16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	
17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	
18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	
19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	



Maya women of San Simón, Yucatán, México prepare the Sac Ha' sacred beverage with ground corn, water collected from morning dew or from a cave, and honey.



A Maya elder from Peto, Yucatán, performs the Sac Ha' ceremony at the archaeological site of Uxmal. During the ceremony, he petitions for rain and for the well-being of Maya workers at the site. He also gives thanks for the offerings of the Earth.



Left image: The **hieroglyphs** corresponding to the nineteen months of the Haab calendar. The Maya represented some of these months using more than one glyph. These are referred to as “variants.” Variants of the same glyph are framed in a turquoise background. For example, the month “Pop” shown in the upper left corner of the image has two variants. The month of Wayeb on the lower right also has two variants.

The Tzolk'in

The sacred Maya calendar is called Tzolk'in in Yucatec Mayan and Chol Q'ij in K'iche'. This calendar combines 20 named days with 13 numbers that, when multiplied, amount to 260 days. The length of the Tzolk'in, 260 days, matches nine cycles of the Moon and the gestational period of humans. The Tzolk'in is also related to the movements of the Sun and the growing cycle of corn.

Table 2 shows the name of each month in Yucatec Mayan and in K'iche'.

Chol Q'ij – K'iche'	Tzolk'in – Yucatec Mayan
B'ATZ'	CHUWEN
E	EB'
AJ	B'EN
I'X	IX
TZ'IKIN	MEN
AJMAQ	K'IB'
NO'J	KAB'AN
TIJAX	ETZ'NAB'
KAWOQ	KAWAK
AJPU'	AJAW
IMOX	IMIX'
IQ'	IK'
AQ'AB'AL	AK'B'AL
K'AT	K'AN
KAN	CHIKCHAN
KAME	KIMI
KEJ	MANIK'
Q'ANIL	LAMAT
TOJ	MULUK
TZ'I'	OK



Hieroglyphs corresponding to the twenty days of the Tzolk'in. The day Imix' is on the upper left of the image and Ajaw is on the lower right.



A Maya representation of the Tzolk'in from the *Madrid Codex*. Time is represented by 260 dots marking a path or a journey of twenty days and thirteen numbers.

Each day name of the Tzolk'in is tied to a number from one to thirteen. A full cycle of 260 days is not complete until every one of the thirteen numbers is attached to every one of the twenty day names. Table 3 shows the progression of day names in K'iche', the corresponding sequence of numbers, and how to read them. The flow of time weaves its way through the calendar. Guatemalan **Day Keepers** say that time moves through the calendar like a serpent.

Table 3: Chol Q'ij Calendar Day Names and Numbers

B'ATZ'	E	AJ	I'X	TZ'IKIN	AJMAQ	NOJ	TIJAX	KAWOQ	AJPU'	IMOX	IQ'	AQ/AB/AL	K'AT	KAN	KAME	KEJ	Q'ANIL	TOJ	TZ'I'
1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7
8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13	1
2	3	4	5	6	7	8	9	10	11	12		1	2	3	4	5	6	7	8
9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2
3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9
10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3
4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10
11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4
5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11
12	13	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5
6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12
13	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6
7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	12	13



A representation of the Feathered Serpent, called Q'ukumatz in K'iche' or Kukulcán in Yucatec Mayan.

A new year is welcomed at every occurrence of the Tzolk'in date 8 Chuwen (8 B'atz' in K'iche'). The new year recurs every 260 days. The K'iche' **Ajq'ijab'** in the highland areas of Guatemala celebrate the new year with a ceremony called **Waxjaqib' B'atz'**. During this ceremony, new calendar **Day Keepers** are initiated.



Roberto Poz Pérez, K'iche', is a calendar Day Keeper in a village near Quetzaltenango, Guatemala.



Printed Tzolk'in calendars are popular in the Yucatán. The Chol Q'ij printed calendar is used daily by many people in the highlands of Guatemala.

The Calendar Round

The complete name of any given date in the Maya calendar system consists of both a Tzolk'in date and a Haab date. The Calendar Round is made from the interweaving of the Tzolk'in and Haab calendars. In the Calendar Round, a given combination of Tzolk'in and Haab will not repeat itself until 52 periods of 365 days have passed. This is based on the mathematical concept of “the least common denominator” and “the least common multiple.” Both 260 and 365 are divisible by 5, and 260 divided by 5 is 52, while 365 divided by 5 is 73. Thus, the least common multiple of 260 and 365 is $5 \times 52 \times 73 = 18,980$. A Calendar Round thus equals 18,980 days, 52×365 , or 52 Haab years. The Maya believe that when a person reaches 52 years of age, they attain the special wisdom of an elder. A Calendar Round date, with both Tzolk'in and Haab components, is able to uniquely mark an event within a 52 year period. However, any event spanning more than 52 years required an additional calendar, the Long Count calendar.



A contemporary representation of the Calendar Round, interlocking the Tzolk'in (left) with the Haab (right).

The Long Count

The ancient Maya also used a calendar system called the Long Count. The Long Count calendar gives each day a unique designation within a time period of approximately 5125 and 1/3 **tropical years**. A Long Count date, plus a Calendar Round date, which includes the Tzolk'in and Haab, were used by the ancient Maya to place mythical and historical events in chronological order. The Long Count calendar is a system that counts 5 cycles of time. This is very similar to the Gregorian calendar system that counts days, months, years, centuries and millennia. The Maya system also does this, but the only difference is in the name and magnitude of the various cycles.

Long Count Time Cycles	
	1 k'in, or 1 day
20 kin	1 uinal, 20 days
18 uinal	1 tun, or 360 days
20 tun	1 katun, or 7,200 days
20 katun	1 baktun, or 144,000 days

Like Maya mathematics, the Long Count calendar system counts by 20s. The exception is in the third cycle, because 18x20, which equals 360, more closely approximates a Haab cycle and yearly solar cycle of 365 days than multiplying 20x20, which equals 400. One full Haab cycle is called a tun.

The Gregorian calendar counts days chronologically, beginning with the birth of Christ. The Maya Long Count calendar also counts days in chronological order, beginning with the mythical date of 13 **baktun**, 0 **katun**, 0 **tun**, 0 **uinal**, 0 **k'in** 4 Ajaw 8 Kumk'u. This date corresponds to August 11, 3114 BCE in the Gregorian calendar.

The largest cycle in the Long Count calendar is the baktun, 144,000 days. An era, or a full cycle, is comprised of 13 baktun cycles. The 13 baktun cycles total 1,872,000 days, or 5,125.366 tropical years. The current cycle, or the 4th era, began August 11, 3114 BCE. On that date, 13.0.0.0.0 4 Ajaw 8 Kumk'u, the Sun was at its **zenith** at midday, and the Maya constellation of the Turtle (Orion) marked the **nadir**, or the **Underworld**. The current Long Count calendar cycle will again reach 13.0.0.0.0 on December 21, 2012 when the Calendar Round date will be 4 Ajaw 3 K'ank'in.



Observation-based astronomy is still practiced by the Maya in their homelands. This continued understanding of the cycles of the Sun and other celestial objects is used to time the agricultural cycle of corn and to conduct ongoing rituals and ceremonies throughout the Maya world.

Additional Resources

Maya Calendar System:

<http://www.famsi.org/research/vanstone/2012/2012Part4.pdf>

<http://www.pauhtun.org/Calendar/Default.htm>

<http://www.mesoweb.com>

Glossary List in this “Living Maya Time” Website (In Resources Section)

*This painting of the ancient hieroglyphic inscription on **Stela C** in Quiriguá, Guatemala, describes mythical events in the Maya story of creation. The top portion gives a Long Count calendar date of 13.0.0.0.0 4 Ajaw 8 Kumk'u, corresponding to August 11, 3114 BCE.*