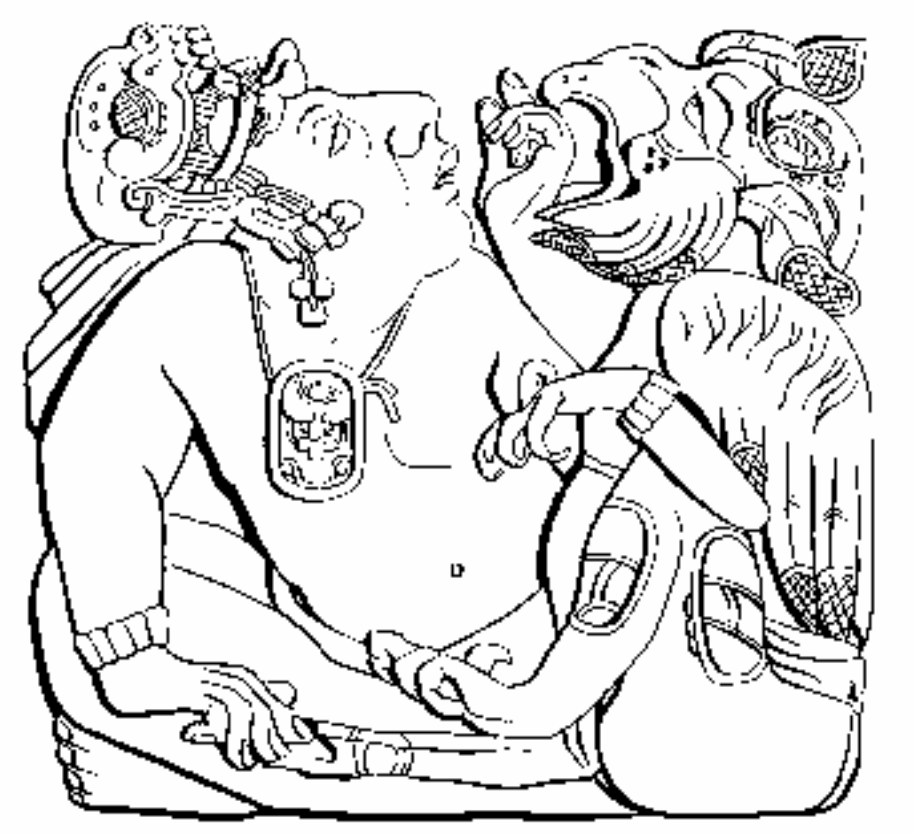
Maya Numbers & The Maya Calendar

A Non-Technical Introduction to MAYA GLYPHS – Book 2

BY MARK PITTS



Maya Numbers and Maya Calendar

by Mark Pitts

This book is dedicated to the Maya people living today in Mesoamerica.

Title Page: A Maya glyph signifying10 periods of about 20 years each, or about 200 years. From Palenque, Mexico.

Book 2:

Maya Numbers & The Maya Calendar

A Non-Technical Introduction to MAYA GLYPHS

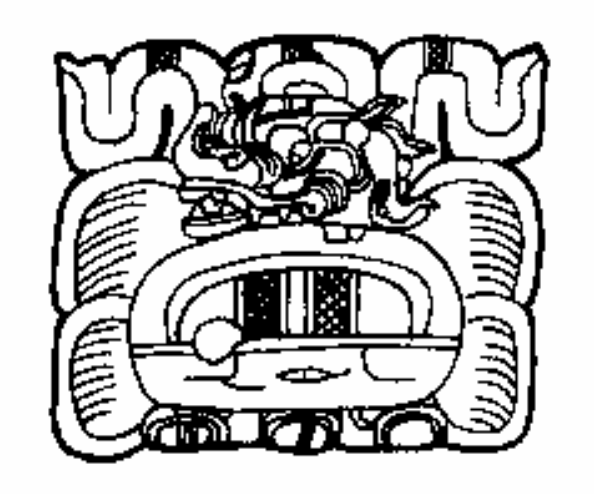


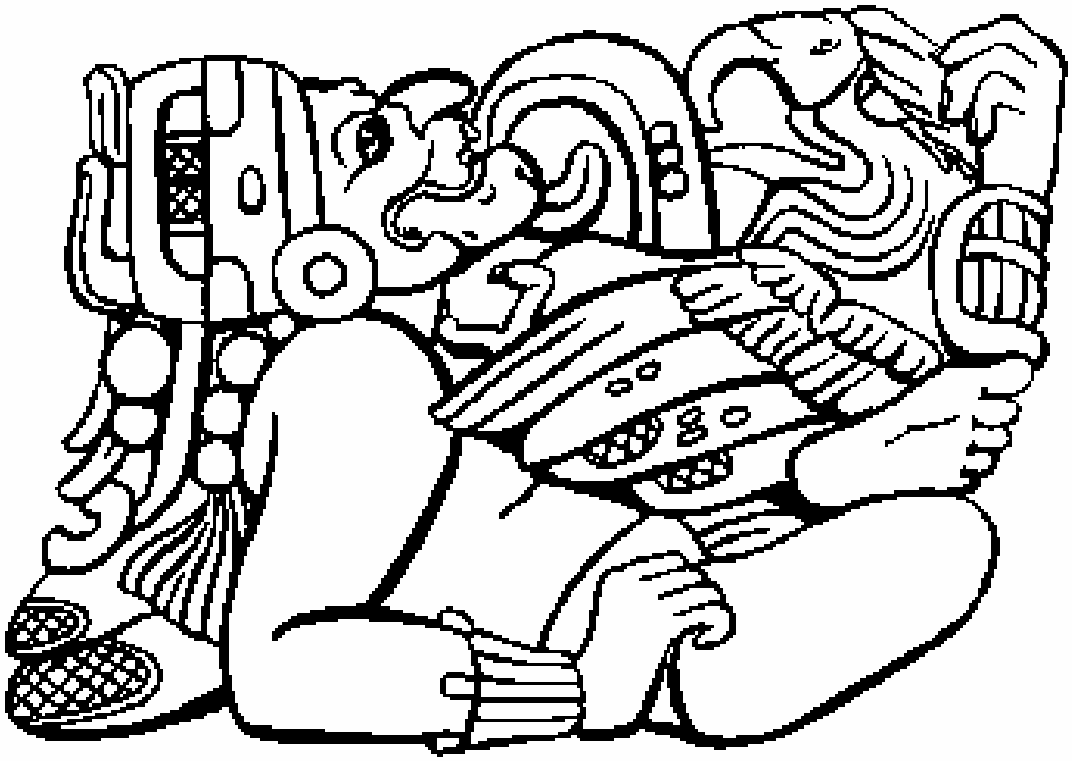
Table of Contents

Book 2:

Maya Numbers and the Maya Calendar

Chapter 1.

Writing Numbers with Bars and Dots



A Maya glyph from Copán that denotes 15 periods of about 20 years each, or about 300 years.

THE BASICS: THE NUMBER ZERO AND BASE 20

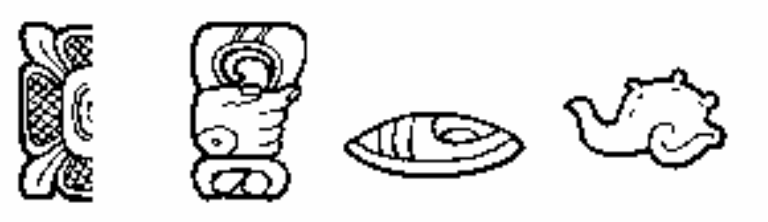
The ancient Maya created a civilization that was outstanding in many ways. They were great artists. They were one of only three civilizations in the world that invented a complete writing system. They were also great mathematicians, time keepers, astronomers, and architects. In this book you will learn a little about their calendar and about their mathematics that allowed them to make so many scientific advancements.

One of the truly great accomplishments of the ancient Maya, and something which has been done only twice in the history of the world, was the “invention” of the number zero.

Although we don’t think much about the number zero, it makes writing and working with numbers much easier. Think about how you would write a number that contains a zero (for example, 20, 101, or 1023), if you could not use a zero to write the number.

The Europeans never invented the zero. The Romans, for example, never had a zero and so most of their numbers were quite hard to write, and their mathematics very difficult and cumbersome. The Europeans eventually borrowed the number zero from the Arabs, who themselves borrowed it from India.

So how do we write a zero in Maya script? The ancient Maya usually had more than one way to write something, and numbers were no exception. Here are the four ways of writing zero that were most popular:



Note that the last two glyphs look like shells. Shells are often empty containers; they contain 'nothing', zero contents.

Our way of writing numbers, which is Arabic in origin, is based on the number 10. Even though we don't usually count on our fingers, (or at least we're not supposed to), we probably use 10 because we have ten fingers.

The Maya based their number system on 20, instead of 10, (no doubt from a total of 20 fingers and toes). This may seem odd at first, and it does take a little getting used to. But, really, it doesn't matter what base you use, at least as long as you have a zero. The computer, which we all know can do math incredibly well, uses a number system based on 2, that is, it only uses the numbers 1 and 0.

So, let's write some simple numbers as the ancient Maya would. The numbers one through four are the easiest:

Our Number		The Maya Number
1	=	
2	=	
3	=	
4	=	

This is easy since the number of “dots” equals the number we need. So, to write the numbers 1, 2, 3, or 4 as the ancient Maya would, we just use 1, 2, 3, or 4 dots.

For the number five the Maya used a “bar:”

5 = 

For the numbers 6 through 10, the ancient Maya combined dots and bars:

6 = 

7 = 

8 = 

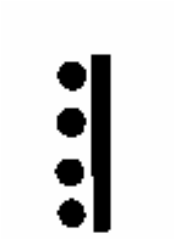
9 = 

10 = 

Thus, counting each dot as a one, and a bar as a five, we just use the right number of dots and bars to add up to the number we want.

Just as when they wrote words, the Maya used a lot of variety in writing numbers. They could write their numbers with horizontal bars and the dots above, just as we have shown above. Or they could write their numbers with vertical bars and the dots

to the left. For example, they could write the number 9 as shown above, or as:

9 = 

No matter how you arrange the parts, one bar and four dots placed together add up to 9, and thus stand for the number 9.

Below you have the number glyphs for 11 thru 19. These glyphs use the very same rules as the numbers from 1 to 10. Each bar counts as five, and each dot counts as a one to give the total number that you want.

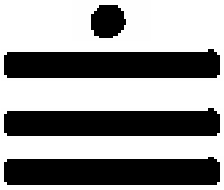
11 = 

12 = 

13 = 

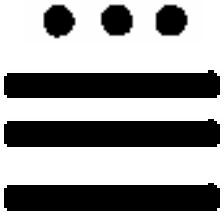
14 = 

15 = 

16 = 

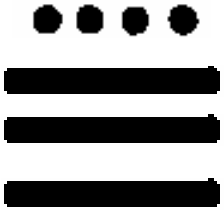
17 = 

18 =



.

19 =



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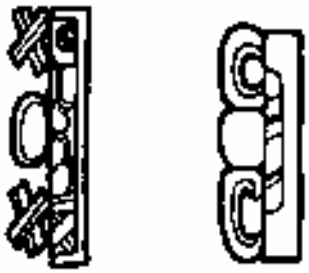
Note that you never use more than four dots in one group. You should practice writing all these numbers until you are sure you understand them.

In addition to plain dots and bars, the ancient Maya often used fancier number glyphs. Here are two examples.



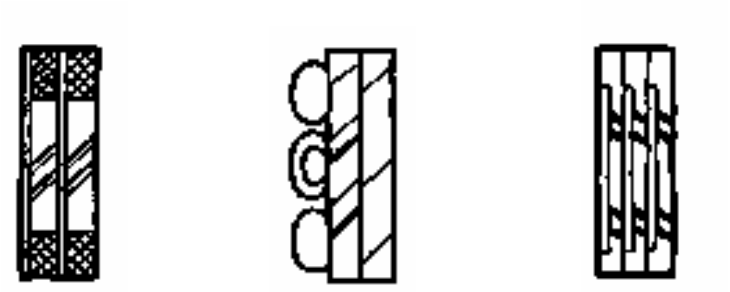
6 6

These two arrangements are just fancier ways to write the number 6. When you first look at the number glyph on the left, you may think this is the number 8; after all it looks like a bar and

three dots. However, in the glyph on the left, the two loops (one above and one below the solid dot in the middle) do not count as dots. Thus the number is really just one bar and one dot, or 6. Similarly, on the right, the Xs do not count as dots, and again the number is 6. Only solid, circular dots count as dots; loops and X's don't count.

The Maya used the loops and the Xs for artistic reasons. They made all their glyphs more or less square in shape to make them fit together more nicely. In these glyphs for the number 6, you can also see that the Maya would often decorate the bars to make them more interesting and artistic.

Here we have three more decorated number glyphs. Can you tell what numbers each of these glyphs stand for?



(If you said ten, twelve, and fifteen, you're learning fast.)

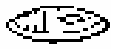
NUMBERS GREATER THAN 19

So far, so good. But how do we write numbers greater than 19?

First let's think about how we write numbers. Our system is based upon the number 10. In our system 10 is also the first number that is made up of two other numbers (namely, a '1' on the left and a '0' on the right). To write the number 10, we put a '0' in the position for the smallest part, and a '1' in the position for the larger part. That is, we put a '1' in the 'tens' position because there is just one ten in the number 10. The zero acts like a 'place holder' in the 'ones' position because there are no 'ones' in the number 10, and having the zero in that place tells us so.

The Maya system was based on the number 20. Thus 20 was also the first number where they had to have digits in two positions (just like 10 is the first number where we have digits in two positions). To write the number 20, they would have a zero in the position for the smallest part, and a '1' in the position for the larger part. Like us, they would use a zero as a place holder in the ones position, because there are no ones in the number 20. In their way of doing things, the second position stood for 20s (not 10s). The number 20 has one twenty and zero ones. So, remembering that the shell glyph stands for zero, here's how 20 could be written:

This is the second position and always tells you how many 20s there are in the number.

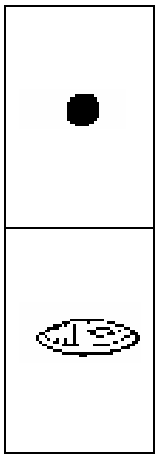


This is the first position and always tells you how many 1s there are in the number, after subtracting the sum of the numbers in the higher positions

Note that the two signs, the dot and the shell, are separated and not placed together like the bars and dots were above. This is important because it has to be clear that they are in two different positions, with the dot clearly in a higher position than the shell.

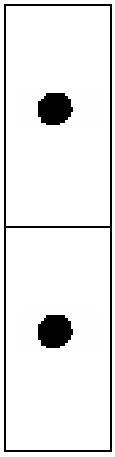
Just so you are sure which position the bars, dots, and shells belong in, we are going to put them in boxes. (The Maya did not do this. Instead, they would just make sure there was enough space between the signs that it was clear what position they were in.) Thus,

20 = (because 20 = **1**x20 + **0**x1)



Now, to start writing numbers bigger than 20, we replace the shell sign with the right number of dot and bars. Thus, we have:

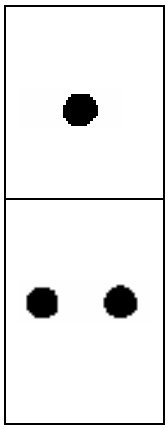
21 = (because 21 = **1**x20 + **1**x1)



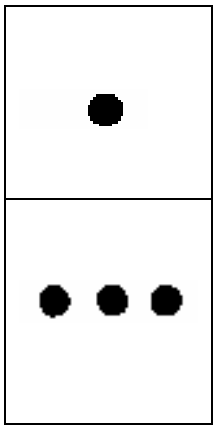
In the upper position we have one dot, which stands for one 20.
In the lower position we have one dot, which stands for one 1.

Using the same idea we can write other numbers:

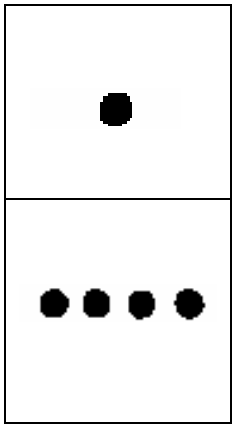
22 = (because 22 = **1**x20 + **2**x1)



23 = (because 23 = **1**x20 + **3**x1)

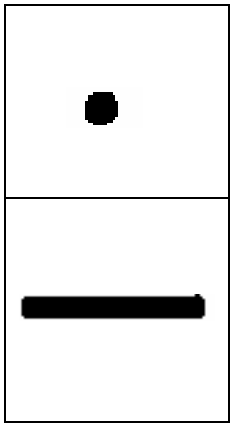


24 = (because 24 = **1**x20 + **4**x1)

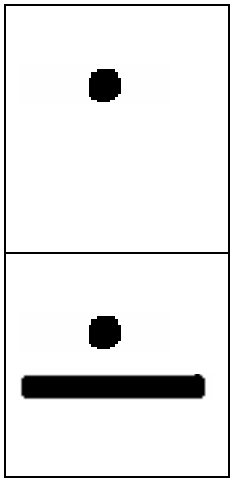


Now, as before, when we want a digit greater than 4, we start using bars:

25 = (because 25 = **1**x20 + **5**x1)

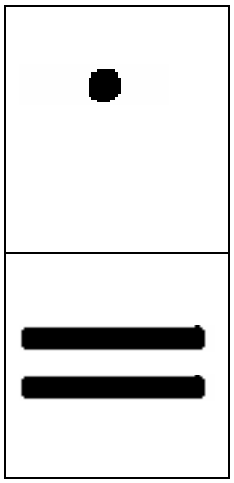


26 = (because 26 = **1**x20 + **6**x1)

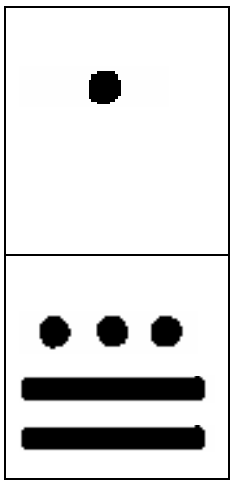


You probably get the idea by now. Here are a few more numbers up to 39. Make sure you understand each of these and that you can figure out how to write the numbers not shown.

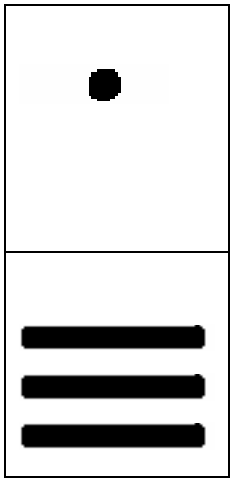
30 = (because 30 = **1**x20 + **10**x1)



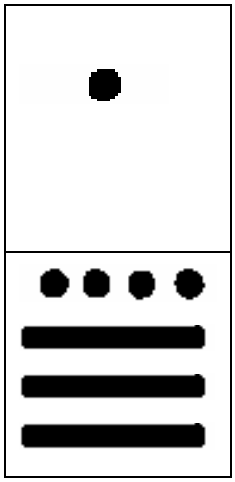
33 = (because 33 = **1**x20 + **13**x1)



35 = (because 35 = **1**x20 + **15**x1)



39 = (because 39 = **1**x20 + **19**x1)



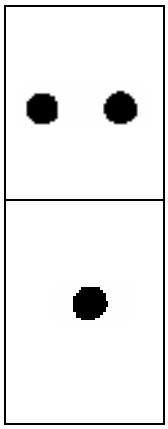
To start writing the numbers 40 and larger, we increase the number of 20s to two, and move the number of 1's back to zero. Thus, because 40 = **2**x20 + **0**x1 we have 40 =

The second position always tells you
how many 20s there are in the number.

The first position always tells you
how many 1s there are in the number, after
subtracting the sum of the
numbers in the higher positions.

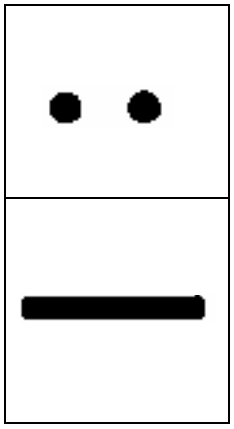
The following is a sampling of numbers greater than 40. Make sure you understand why each number is written the way it is.

41 = (because 41 = **2**x20 + **1**x1)

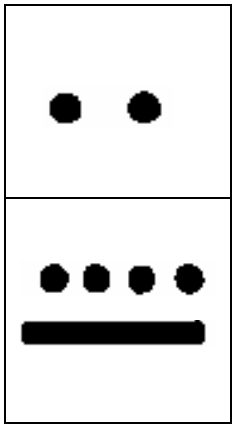


In the upper position we have two dots, which stand for two 20s.
In the lower position we have one dot, which stands for one 1.

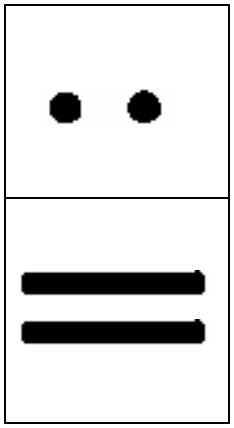
45 = (because 45 = **2**x20 + **5**x1)



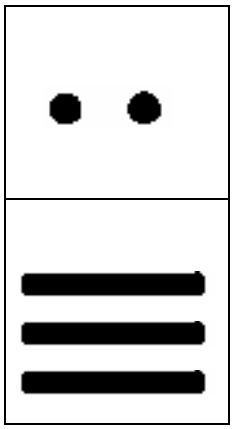
49 = (because 49 = **2**x20 + **9**x1)



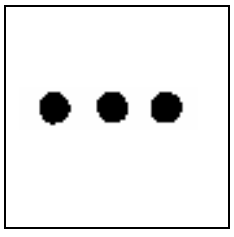
50 = (because 50 = **2**x20 + **10**x1)

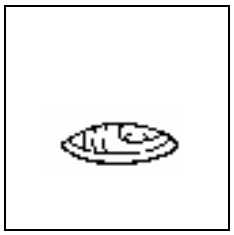


55 = (because 55 = **2**x20 + **15**x1)

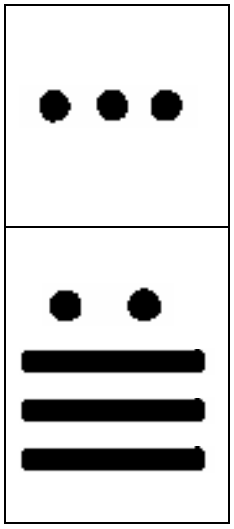


60 = (because 60 = **3**x20 + **0**x1)

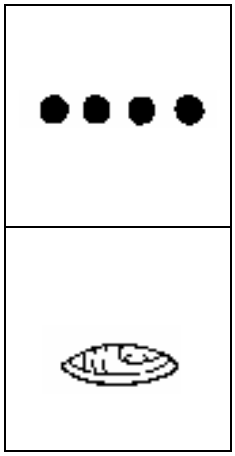




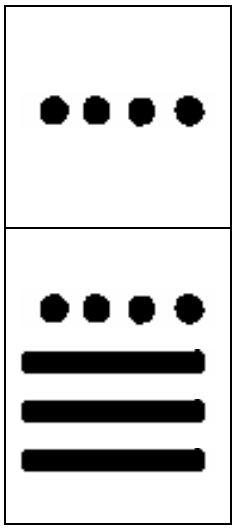
77 = (because 77 = **3**x20 + **17**x1)



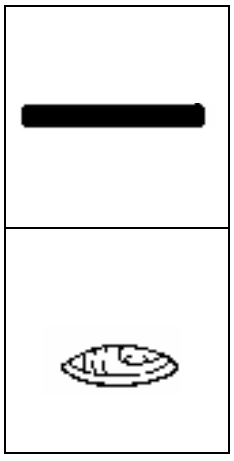
80 = (because 80 = **4**x20 + **0**x1)



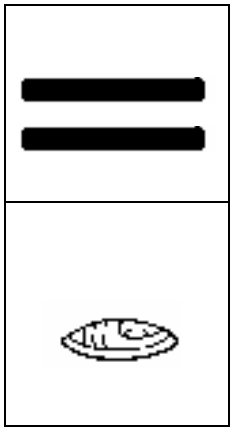
99 = (because 99 = **4**x20 + **19**x1)



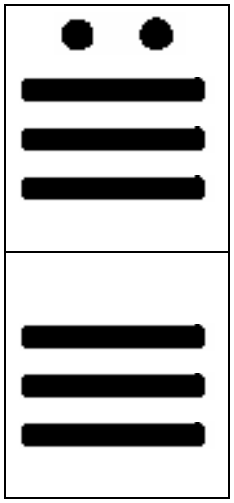
100 = (because 100 = **5**x20 + **0**x1)



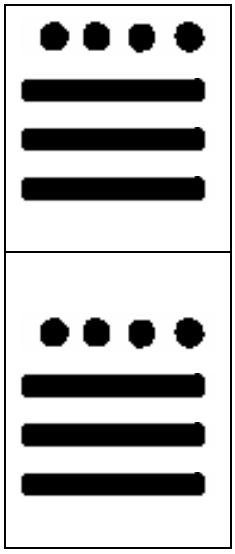
200 = (because 200 = **10**x20 + **0**x1)



355 = (because 355 = **17**x20 + **15**x1)



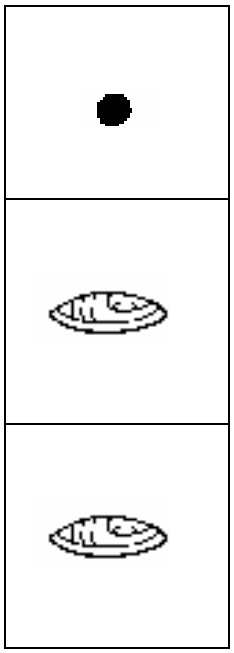
399 = (because 399 = **19**x20 + **19**x1)



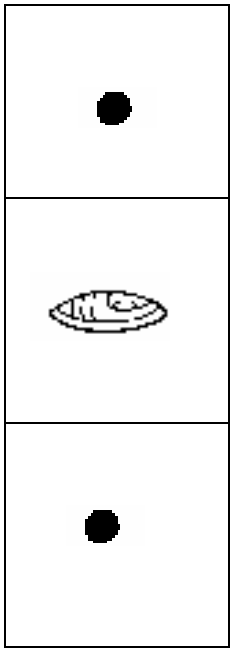
NUMBERS GREATER THAN 399

For numbers over 399, we start using the third position. The third position tells you how many 400s there are in the number. (Remember, the first position always hold the 1s, the second position holds the number of 20s, and now the third position will hold the number of 20x20s, that is, the number of 400s.) Thus,

400 = (because 400 = **1**x20x20 + **0**x20 + **0**x1)

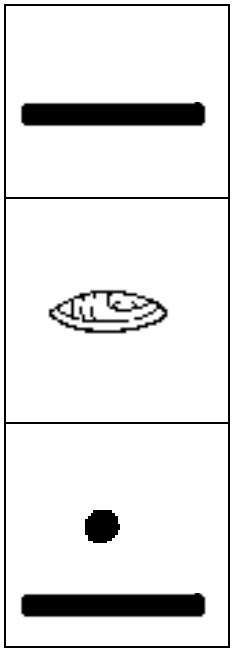


401 = (because 401 = **1**x20x20 + **0**x20 + **1**x1)



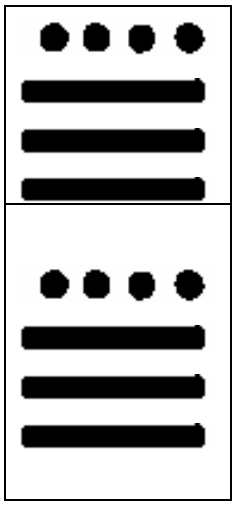
Maya numbers are quite useful for writing the years of the Gregorian calendar (i.e. the calendar that we use every day). Thus, for example, we can write 2006 as:

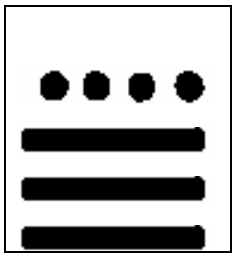
2006 = (because 2006 = **5**x20x20 + **0**x20 + **6**x1)



We can continue writing numbers in this manner up to 7999:

7999 = (because 7999 = **19**x20x20 + **19**x20 + **19**x1)

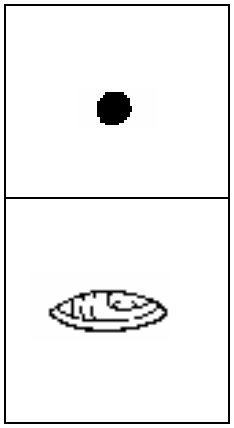


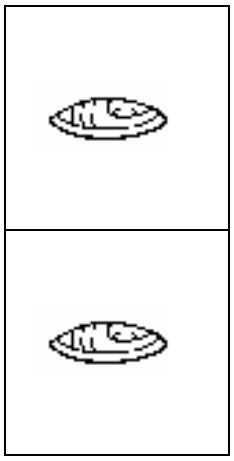


NUMBERS GREATER THAN 7999

When we get up to 8000, we have to use the fourth position in the Maya numbers. The fourth position holds the number of 8000s that are in the number we want to write, the third position holds the number of 400s, the second position the number of 20s, and the first position the number of 1s. (Note that you get these numbers by multiplying 20s. That is, first position = 1s, second position = 1x20 = 20s, third position = 1x20x20 = 400s, forth position = 1x20x20x20 = 8000s. This is the same as $20^0 = 1$, $20^1 = 20$, $20^2 = 400$, and $20^3 = 8000$. You can continue the same way for the fifth, sixth, and all higher positions.)

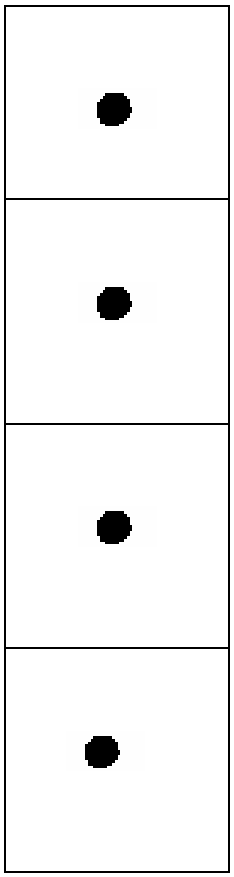
Thus, 8000 =





(because 8000 = **1**x20x20x20 + **0**x20x20 + **0**x20 + **0**x1).

And, 8421 =

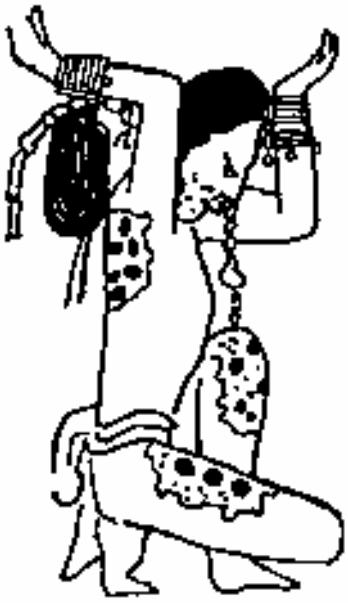


(because 8421 = **1**x20x20x20 + **1**x20x20 + **1**x20 + **1**x1).

It should be obvious by now that we can write really big numbers using the Maya number system. In fact, just as in our

number system, there really is no limit to how big a number you can write.

Make up some numbers and practice writing Maya numbers on your own.



Maya God of the Number Nine

Chapter 2.

Writing Numbers with Glyphs

A Maya glyph from Palenque signifying zero days.

MAYA HEAD GLYPHS

The Maya usually had more than one way to write things. As we saw earlier, the Maya had some special glyphs for the number 0. In addition, the Maya used 'head glyphs' and 'full body glyphs' for the numbers from 0 to 19.

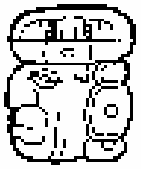
First, let's look at some head glyphs for the numbers. The following shows the most common head glyph for each number up to 19, together with a few clues on how to distinguish each one. We've also included in parentheses the ancient Maya word for each number.

One (*jun*) – Young female goddess (possibly of the moon). Note the single long curling lock of hair along the jaw. Also, the 'IL' sign frequently appears on the cheek and there is an ornament on the forehead. Usually the forehead ornament (just behind the upper part of the nose) has more than one part.

Two  (c*ha'*) – The head of a man, with a hand over the head and the '*sak*' sign  to the left. (*Sak* was a Maya sign for white. See *Book 1: Writing with Maya Glyphs.*)

Three  (*ux*) – The head of a person with a disk on the forehead, often with a woven headdress, and often with the 'IL' sign or a "T" sign on the cheek.

Four  (*chan*) – The Sun God, identified by the square shaped eye and square pupil. It often has the *k'in* (sun) sign, here shown where the ear would be. Also, there is often a filed front tooth and a wavy sign coming from the corner of the mouth.

Five  (*ho*) – An aged face. This glyph always contains the 'tun' or year sign, i.e.  . (We will explain this sign later when we discuss the Maya calendar.)

Six  (*wak*) – Identified by the hatchet (which looks like an X) where the pupil ought to be. Also, like the number 4, there is often a filed front tooth and a wavy sign coming from the corner of the mouth.

Seven  (*wuk*) – The Jaguar God of the underworld, this glyph has a curl in the eye, and often a filed front tooth.

Eight  (*waxak*) – The young Corn God. In the glyph there is a single curl on the forehead, the 'IL' sign may appear on the cheek, and a series of dots or wavy line along the side of the face (which may represent grains of corn). Sometimes the hair and the back of the head sweeps back to form a shape like an ear of corn with protruding corn silk. It can be easy to confuse the eight with the one. Usually the eight will have a single ornament on the forehead, (whereas the number "one" will usually have an ornament with 2 or 3 separate parts).

Nine  (*bolon*) – A young man with a beard and jaguar spots on the check, this glyph is probably a representation of Yax

Balam. Note the *yax* glyph,  , meaning 'first' on the forehead. (Yax Balam was one of the heros from the Maya creation myth called the Popol Vuh.)

Ten  (*lajun*) – The skull of the God of Death. Note the large fleshless jaw. Sometimes there will be a '%' sign on the check (a Maya sign of death).

Eleven  (*buluk*) - Head of the Earth Goddess. Note the cross-hatched eye and the curl on the forehead in the shape of a question mark.

Twelve  (*lajcha*) – A god who wears the sky symbol,  ,*chan*, on his forehead.

For numbers 13 through 19, the glyphs are the same as for the numbers 3 through 9, except that the fleshless jaw of the God of Death is added:

Thirteen  (*uxlajun*) - Same as the number three, except that the glyph has the jawbone of the God of Death.

Fourteen  (*chanlajun*) – Same as the number four, except that the glyph now has the jawbone of the God of Death.

Fifteen  (*holajun*) – Same as the number five, but with the jawbone of the God of Death.

The pattern is repeated for numbers sixteen through nineteen:

Sixteen  (*waklajun*).

Seventeen  (*wuklajun*).

Eighteen  (*waxaklajun*).

Nineteen  (*bolonlajun*).

Zero  (*mih*) – A head with a hand over the lower jaw. As indicated before, zero is often used to signify that something

has been completed or finished. Similarly, as we will explain later, when used in relation to time and the calendar, the Maya used the number zero to indicate the end or completion of some period of time (often the 20th period of time).

A glyph signifying 5 years from Copán, Honduras.

Below all the head glyphs are placed together. Before moving on to the next section, make sure you know one or two key characteristics for each head glyph and can distinguish each one.

1

11

2 

 12

3 

 13

4 

 14

5 

 15

6 

 16

7 

 17

8 

 18

9 

 19

10 

 0

THE NUMBER 20

Before we start on the Maya calendar, there are some special glyphs that you should know for the number 20. The number 20 was special because the whole number system was based on this number, and the Maya had some special signs for 20. Here are two of the most interesting, which you should learn to recognize:

20

20

Two numbers that you will see frequently in Maya glyphs are the numbers 29 and 30. This is because the 'lunar month' (i.e. the time from one New Moon to the next New Moon) is always about 29 ½ days. The Maya would round this fractional period to the closest number of full days, which would be either 29 days or 30 days. Here's how the Maya often wrote the numbers 29 and 30:

29

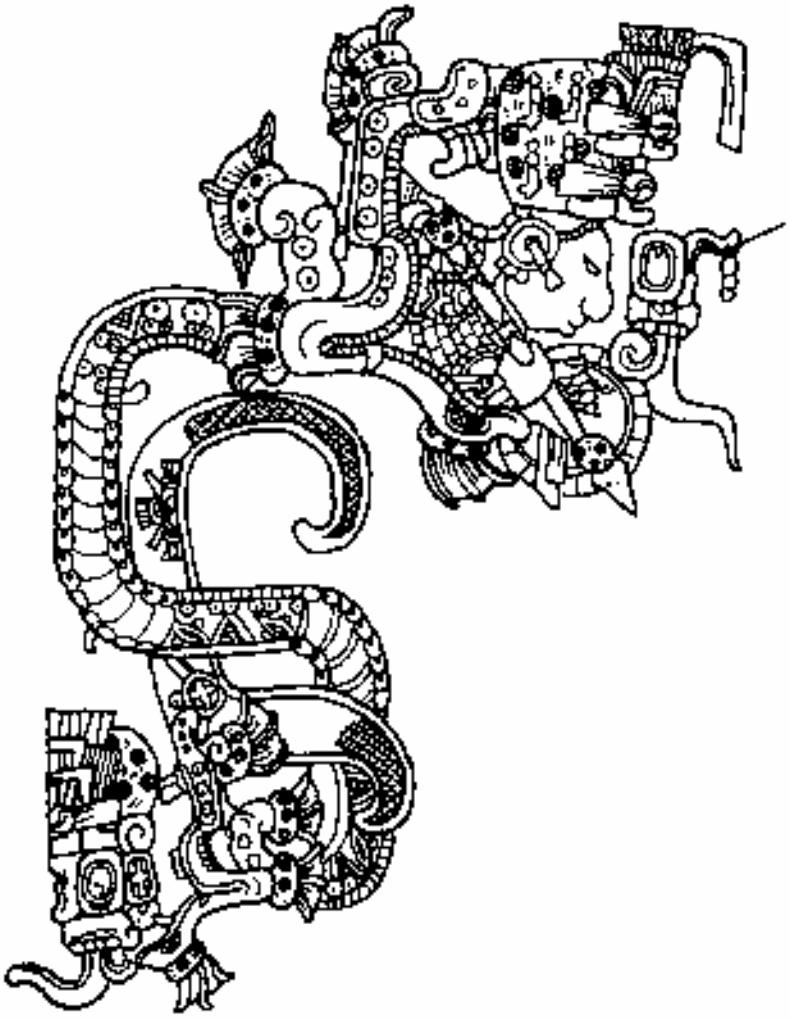
30

These numbers combine the special sign for the number 20 with bars and dots for either 9 or 10. Make sure you understand why these glyphs equal the numbers 29 and 30.

As we will see in later chapters, Maya months in the "civil" calendar had 20 days. And they had another cycle of 20 days in their "sacred" calendar. Instead of decades consisting of 10 years, they had *k'atuns* that were 20 years each. So, 20 was indeed a special number.

Although it is frequently said that the Maya did not have fractions, they certainly understood fractions, and even sometimes had symbols to denote them. For example, to denote a period of 10 years, they might use a glyph that stood for one-half a k'atun (that is, one-half of a twenty year period). The glyph for a 10 year period written this way was  .

Finally, there was a special glyph for the number 1. How would you say "one" if you could not speak? If you said: "by holding up one finger", you are beginning to think like the ancient Maya. Thus, besides the single dot, the Maya glyph for the number one (*jun* in the Maya language) is:  .



A Vision That Appeared to a Maya Queen on 9.12.9.8.1 .

Chapter 3.

The Sacred and Civil Calendar of the Maya

A carrier of time bearing his load, from Copán, Honduras.

OVERVIEW OF THE MAYA CALENDAR

Creating a calendar and keeping track of the days and seasons is not easy. And no one's calendar is simple. To understand how complicated it can get, all you have to do is think about our own calendar. Our year has 12 months, some with 31 days, some with 30 days, and one with 28 days (except every four years, when it has 29 days.) Then, we have 24 hours in each day (which consists of two segments of 12 hours each, am and pm), 60 minutes in each hour, and 60 seconds in a minute. So we use 28, 29, 30, and 31 days, 12 and 24 hours, and 60 minutes and 60 seconds, despite the fact that we base our number system on 10. In fact, the number 10 is not really used at all in keeping track of time. Now that's complicated!

The ancient Maya were incredible astronomers and mathematicians. In fact according to some calculations, when the Spanish came to Meso-America in the early 1500s, the ancient Maya measurement of the length of the year was the most accurate in the world, including that of Spain.

In this chapter, we will explain the Maya calendar system and how it worked. The Maya calendar is made up of three cycles called the *Tzolk'in*, the *Haab*, and the Long Count. Despite its precision, the Maya calendar is steeped in traditions that in many cases relate to Maya stories about the creation of the world.

In parts of Guatemala and Mexico the traditional Maya calendar is still used alongside the Gregorian calendar.

You might find the Maya calendar hard at first. But if you read through this section more than once, and keep in mind that there is no one "right" way to keep track of time, you will soon be able to understand the Maya calendar. The Maya calendar is beautiful and in many ways more logical than our own.

AN EXAMPLE

The Gregorian date we call "Saturday, April 12th, 1997" records:

Saturday	The day in a cycle of 7 ***days*** with *names* (the week)
12th	The day in a cycle of **days** with *numbers* (day of the month)
April	Where the day falls in a cycle of 12 ***months*** with *names*
1997	Count of *years* since the beginning of the Christian cycle

To compare, this same date as written by the Maya is
"*5 Lamat 6 Pop 12.19.4.1.8"*

5	The **day** in the cycle of 13 **Tzolk'in** *days with numbers*
Lamat	The **day** in the cycle of 20 **Tzolk'in** *days with names*
6	The **day** in the cycle of 20 **Haab** *days with numbers*
Pop	The **month** in the cycle of 18 **Haab** *months with names*
12.19.4.18.8	Count of *years* since the birth of a Maya cycle

The Maya would also normally record additional information about the moon -- days since its appearance, the name and number of the lunar cycle, and the number of days in the lunation. They would also tell us which "Lord of the Night" ruled[1].
(Endnotes appear at the end of this book.)

Now let's learn what these names and numbers mean and how we can write a Gregorian date in Maya glyphs.

THE SACRED CALENDAR & SACRED YEAR (Tzolk'in)

The sacred Maya calendar was called the *Tzolk'in*. This Sacred Calendar is still used in some Maya communities today.

The sacred *Tzolk'in* calendar had 260 days. The *Tzolk'in* consists of the numbers 1-13 alternating against a cycle of 20 day names, with their number-day combination restarting every 260 days (13 x 20 = 260). You might find it useful to think of these two cycles as two "weeks" going on at the same time – one week where the days have numbers, and one week where the days have names.

The twenty day names in the Maya Sacred Calendar are:

Imix
Ik'
Ak'bal

K'an

Chikchan

Kimi

Manik'

Lamat

Muluk

Ok

Chuwen

Eb

Ben

Hix

Men

Kib

Kaban

Etz'nab

Kawak

Ajaw

The other cycle within the Tzolk'in had 13 days and gave each day a number (but not a name). Thus, the days were simply 1, 2, 3, etc up to 13. After 13, this started over again with day 1, then 2, 3, etc.

For example, as shown in the table below, if we start with 1 Imix the Tzolk'in will proceed for 13 days until it reaches 13 Ben. Then, for the next 7 days it counts from 1 Ix (day 14), 2 Men (day 15), 3 Kib(day 16), etc, up to 7 Ajaw — for a total of 20 days.

Then the days with names will start over again with Imix, but with the day number 8, i.e. a Tzolk'in date of 8 Imix.

Count of the Tzolk'in
1 Imix
2 Ik'
3 Ak'bal
4 K'an
5 Chikchan
6 Kimi
7 Manik'
8 Lamat
9 Muluk
10 Ok
11 Chuwen
12 Eb
13 Ben
1 Hix
2 Men
3 Kib
4 Kaban
5 Etz'nab
6 Kawak
7 Ajaw
8 Imix, etc…

The reason the *Tzolk'in* has 260 days is that it takes exactly 260 days for the calendar to repeat. If you start with any day

number and day name combination, it will be 260 days until that combination of day number and day name are repeated.

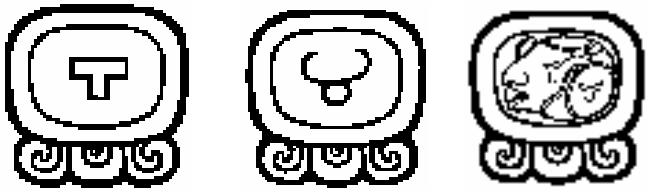
Thus, in the sacred *Tzolk'in* calendar every day had both a name and a number. Like most sacred calendars, the days were full of meaning. Much meaning was, and is, ascribed to each of the twenty days in the 20 day cycle, and to a lesser extent, to each of the numbers in the 13 day cycle.

Below are the days that formed the 20 day cycle in the sacred calendar together with their glyphs. Each day glyph is composed of a "cartouche," which is a circular frame with some curls on the bottom. Whenever you see a date glyph with a cartouche, you can be sure you are looking at a glyph for one of the days.

You should learn to recite these days in order, and learn to recognize at least one glyph for each day. Also, read the descriptions carefully so that you understand the meaning of the day or the glyph for the day.

Imix

The glyph for Imix contains a water lily. According to Maya traditions, Imix represents darkness and the Water Lily Monster.

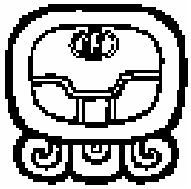


Ik’

Ik’ represents the wind. The ‘T’ form in the center is the Maya glyph for wind. A similar form appears on the ear spool of the head on the right. (We also saw it on the head glyph for “3.”) Ik’ can also represent the human voice, air, and life.

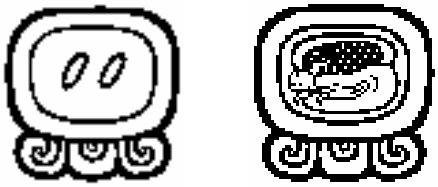
Ak’bal

Ak’bal represents a serpent and darkness. Within the glyph are representations of snake markings (on the upper part) and the scales of a snake (on the lower part). Ak’bal can also represent dawn and morning.



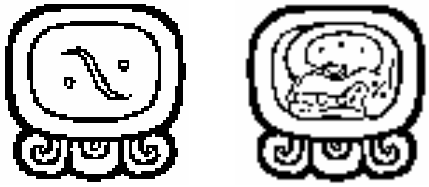
K’an

K’an represents a grain of corn, the Corn God, and food itself. The word K’an in Mayan languages means yellow.



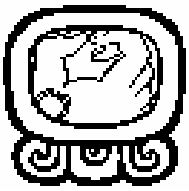
Chikchan

Chikchan represents the feathered serpent, or the serpent of the heavens. It also represents justice, peace, and truth.



Kimi

Kimi represents death, the Lord of Death, and the Lords of the Underworld. The “percent” sign in the center of the glyph on the left, and on the cheek of the skull on the right, was a Maya symbol of death. (We saw these signs earlier on the glyphs for the number 10.)



Manik’

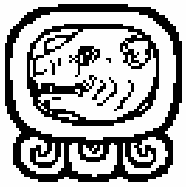
In the center of the glyph for Manik’ was a hand. This glyph represents the deer.

Lamat

Lamat represents Venus. Venus was very important to the ancient Maya.

Muluk

Muluk represents water and animals that live in the water. In the third glyph, you can see the head of an animal.



Ok

Ok represents the dog, the guide, friendship, and fidelity.

Chuwen

Chuwen represents a monkey. According to tradition, the Sacred Year starts on 8 Chuwen. Chuwen is a symbol of the step-brothers in the Maya story of creation, the Popol Vuh. These brothers were changed into monkeys.

Chuwen can also represent thread and the continuity of life.

Eb

The glyph for Eb contains the skeletal head of the Lord of Death. The glyph for Eb is similar for the glyph for Kimi (see below), but it has the cluster of “grapes” on the back part of the head. Eb can also represent the teeth.

Ben

The glyph for Ben can be quite simple. It represents corn, but also trees and reeds.

Hix

Hix signifies the jaguar. The three dots could represent the spots of the jaguar.

Men

A supernatural bird appears in the center of the glyph for Men. Men represents the birds.

Kib

Kib is a representation of a sea shell.

Kaban

Kaban represents the Earth. (The shaded spot together with the ‘squiggle’ usually represent the Earth.) It can also represent thought, knowledge, and science.

Etz’nab

This glyph represents a knife blade made of stone or obsidian.

Kawak

Kawak is associated with rain and storms. The form in the upper left represents storm clouds. The circular part inside the cartouche can represent the year or a stone.

Ajaw

Ajaw is the day of the God of the Sun. It is also a title that means “Lord.” It also represents Junapuh one of the hero twins of the Maya creation story, the Popol Vuh. On the glyph on the right, you can see the characteristic single *jun* spot on the cheek, as well as the headband that was a symbol of royalty.

In Appendix 2 all the days of 2004 are shown with their corresponding day from the Maya Sacred Calendar (as well as other aspects of Maya dates that we have not discussed yet). Look at those dates to make sure you understand how the day names were used alongside the day numbers in the *Tzolk’in*.

It is important to know that while all days in the Sacred Calendar have a special meaning, certain days in the sacred calendar stand out above the rest. For example, according to modern Maya traditions in Guatemala, *8 Chuwen* is the first day of the sacred year. Other special days in the sacred year together with their meanings can be found in Appendix 1. Since the *Tzolk’in* has only 260 days, special days in the *Tzolk’in* may sometimes occur twice in one year in the *Haab*, or twice in our Gregorian calendar. For example, in 2005, the start of the sacred

year, i.e. day 8 *Chuwen* occurs two times, and thus there are two 'New Year's Days' in the Gregorian year of 2005.

THE CIVIL CALENDAR & CIVIL YEAR (*Haab*)

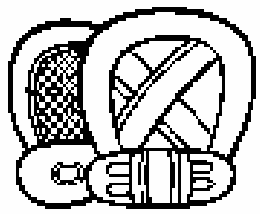
The ancient Maya had both a Sacred Calendar and a Civil Calendar. We also have both sacred and civil calendars. For example, we have the regular (i.e. civil) calendar that everyone uses. However, the Christian church, for example, has its own calendar to mark important events in the life of Christ and the saints. The church calendar can operate quite independently from the civil calendar. This is why Easter falls on a different date each year. Similarly, other religions have their own sacred calendars to mark days that are important in those religions.

The Maya Civil Calendar is called the '*Haab*' in Mayan languages. This calendar has 365 days per year, which is sometimes called the 'vague year.' It is the same as our year, but does not make the leap year adjustments every four years, (although the ancient Maya certainly knew that the length of the year was approximately 365-1/4 days).

The year in the civil, or *Haab*, calendar consists of 18 months, each with 20 days. At the end of the year, there is a special month of only 5 days, which gives the total of 365 days.

The names and glyphs for the 18 full months and the one short month are given below. The name in ancient Maya is given in parentheses.

Pop  (***K'anjalab***)

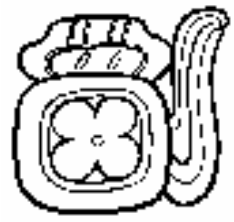
Wo  (***Ik'at***)

Sip  (***Chak'at***)

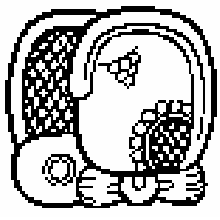
Sotz'  (***Sutz'***)

Sek  (***Kasew***)

Xul  (***Chikin***)

Yaxk'in  (***Yax K'in***)

Mol  (***Mol***)

Ch'en  (***Ik' Sijom***)

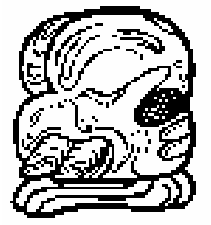
Yax  (***Yax Sijom***)

Sak  (***Sak Sijom***)

Keh  (***Chak Sijom***)

Mak  (***Mak***)

K'ank'in  (***Uniw***)

Muwan  (***Muwan***)

Pax  (***Paxil***)

K'ayab  (***K'anasiy***)

Kumk'u  (***Hul Ol***)

Wayeb  (***Uway Hab***)

In the Maya *Haab* calendar, the months function very much like ours do. That is, for any given month we count through all the days of that month, and then move on to the next month. All the Maya months have 20 days, except the very last month Wayeb, which has only 5 days. The 5 days of the month of Wayeb are usually considered to be a time of bad luck.

Normally the day 1 Pop is considered the first day of the civil year, just as 1 January is the first day of our year. In 1999, 1 Pop was on April 7th. But, because of the leap year in 2000, 1 Pop falls on April 6th in the years 2000, 2001, 2002, and 2003. Then, because of the leap year in 2004, the day 1 Pop shifts to April 5th in the years 2004 through 2007. Thus, 1 Pop stays on the same day for four years in the Gregorian calendar, but then comes one day sooner in the year after each leap year.

As we said, the *Haab* calendar months work very much like ours do. Starting with 1 Pop, the next day is 2 Pop, then 3 Pop, etc. We move through the 20 days of the month of Pop, and then move on to the next month, called Wo. We go through the 20 days of Wo, and move on to the next month, called Sip, and so forth throughout the year in a manner very similar to our own calendar.

The only unusual aspect of this calendar is that although there are 20 days in each of the 18 months, the last day of the month is not called the 20th. Instead, the last day of the month is referred to as the ‘seating,’ or ‘putting in place,’ of the next month.

So, the day after 19 Pop is not 20 Pop, but instead the 'seating of Wo.' And the day after 19 Wo is not 20 Wo, but instead the seating of Sip. The day after 19 Sip is the seating of Sotz', and the day after 19 Sotz' is the seating of Sek, and so forth throughout the year.

If you think about it, the Maya were not doing things very much different from the way we sometimes do things. For example, we often call December 31st "New Years Eve." Thus, like the ancient Maya, we don't name the day for what it is (the last day of the old year), but instead we name it for what is about to happen (i.e. the New Year).

In the language of the ancient Maya, the word for seating was *chum*, and they had several special glyphs to signify the day of seating, or the last day of the month. Here are three that you will see a lot:

So, how do we write a Maya date? It's easy! To write the Maya month and day of the month, just combine the glyph for the month with the glyph for the number. The number glyph should be placed to the left or above the glyph for the month. For the

number, you can use either bars and dots or a head glyph that stands for the number. Thus, for example, you can write:

11 Ch'en 

17 Mak 

9 Yax 

Seating of Muwan 
(i.e. the last day of K'ank'in)

We can do the same with dates from the Tzolk'in. To write a date from the Tzolk'in, just write the glyph for the name, with the Tzolk'in number to the left or on top.

Make sure you understand each of these glyphs before moving on to the next section.

THE CALENDAR ROUND

Okay, now you know about the *Tzolk'in* and sacred year, and about the *Haab* and civil year. When we put them together we get the "Calendar Round." The Calendar Round for any day is just the date in the *Tzolk'in* together with the date in the *Haab*.

When the ancient Maya wanted to give a date, they would usually tell us the date in Calendar Round. Thus, for example, a day might be given as *5 Kimi 4 Pop*. This means that the day number in the *Tzolk'in* is 5. The day name in the *Tzolk'in* is *Kimi.* And, in the *Haab*, the day falls on the 4th day of the month *Pop*.

In a Calendar Round date there are always two numbers and two names, and they are always written in the same order:
(1) the day number in the *Tzolk'in*,
(2) the day name in the *Tzolk'in*,
(3) the day of the month in the *Haab*, and
(4) the month in the *Haab*.

As you can see by now, in the Maya calendar there are several cycles all going on at the same time. First, there is the *Tzolk'in* cycle which consists of numbers 1 - 13 alternating against a cycle of 20 day names. Then there are the days and months in the *Haab*, which has 18 months of 20 days each, and one short month of 5 days.

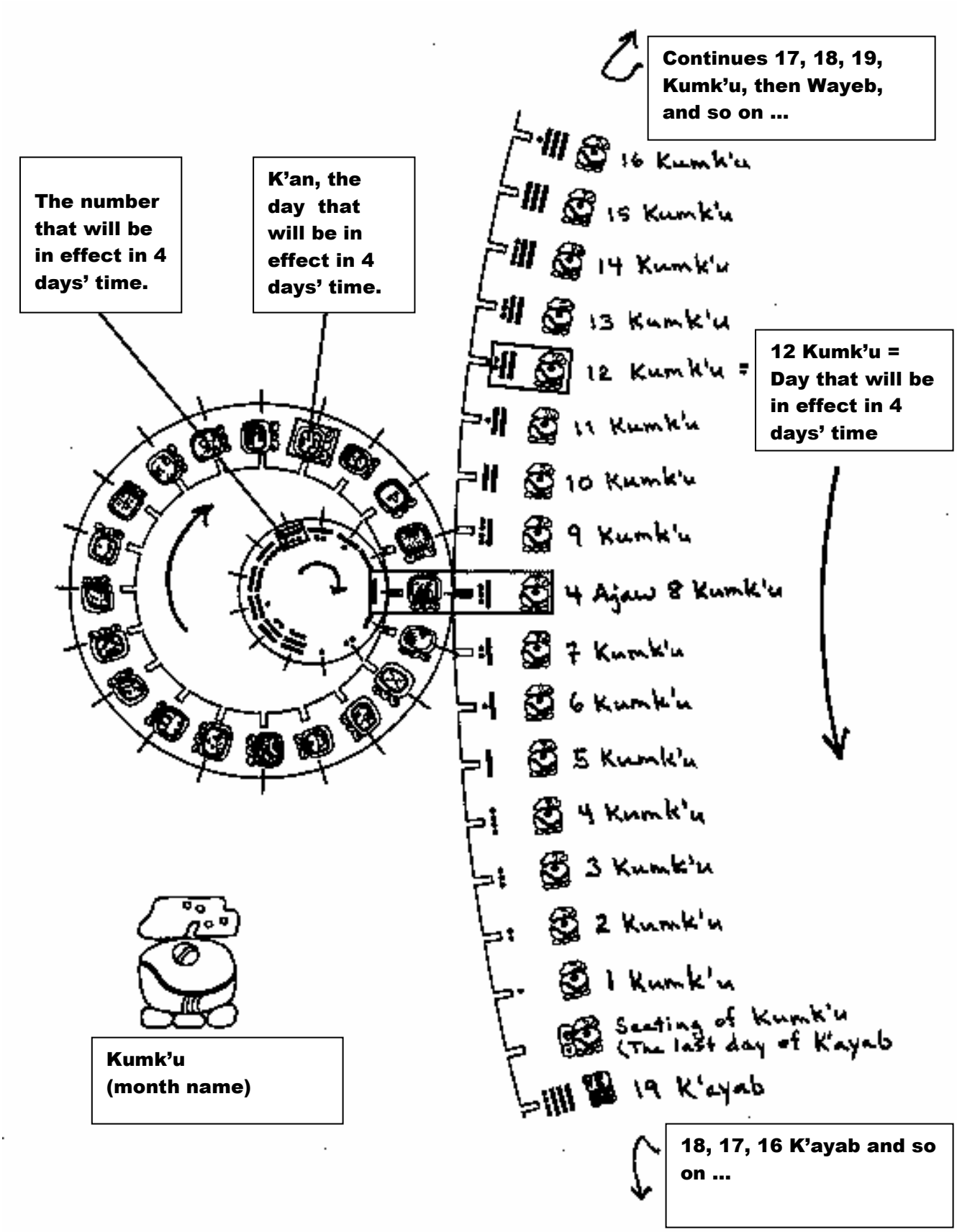
Below is a picture of how it all works. In the illustration the calendars are shown as gear wheels that move ahead one cog

each day. In the picture, we start with the Calendar Round date of *4 Ajaw 8 Kumk'u*, (but we could have started with any Calendar Round day). The important thing is to visualize how the calendar gears move forward and how the Maya dates change each day.

In Appendix 2, the Calendar Round dates for each day in 2004 are given. Look through these dates to check your understanding of how all the Maya cycles of time fit together.

You now know that the *Tzolk'in* repeats every 260 days, and that the *Haab* repeats every 365 days. But how long does it take for a Calendar Round date to repeat? For example, if we start with 4 Ajaw 8 Kumk'u, how long before 4 Ajaw 8 Kumk'u shows up again? It turns out that it takes approximately 52 of our years for this exact date to reappear. (To be more exact, it takes exactly 52 Maya civil years, or 52 x 365 days, for the date to show up again.)

For the ancient Maya, who usually did not live as long as we do today, any particular Calendar Round date would usually show up only once in a life time. Thus, one could speak of 5 *Kimi 4 Pop*, or any other Calendar Round date, and it would be clear when one talking about. We do more or less the same thing ourselves. For example, we might say someone was born in '98, and everyone knows perfectly well that we are talking about 1998, and not 1798, 1898, or 2098.


Continues 17, 18, 19, Kumk'u, then Wayeb, and so on ...
The number that will be in effect in 4 days' time.
K'an, the day that will be in effect in 4 days' time.
16 Kumk'u
15 Kumk'u
14 Kumk'u
13 Kumk'u
12 Kumk'u =
12 Kumk'u = Day that will be in effect in 4 days' time
11 Kumk'u
10 Kumk'u
9 Kumk'u
4 Ajaw 8 Kumk'u
7 Kumk'u
6 Kumk'u
5 Kumk'u
4 Kumk'u
3 Kumk'u
2 Kumk'u
1 Kumk'u
Seating of Kumk'u (The last day of K'ayab
19 K'ayab
Kumk'u (month name)
18, 17, 16 K'ayab and so on ...

Finally, let's think a little bit more about how the Tzolk'in and Haab calendars fit together. The fact that there is a cycle of 20 days in the *Tzolk'in* and there are 20 days in the 18 months of the *Haab* produces some interesting facts of which the ancient Maya were well aware. First is the fact that, in any given civil year, the first day of all the months in the *Haab* start with the same day from the *Tzolk'in*. Thus, for example, if the first day of the civil year (i.e. 1 Pop) is on Ak'bal, then the first day of every month in that civil year will be Ak'bal. Similarly, if 1 Pop falls on Ben, then every month in that year will start on Ben.

Given the short month of 5 days at the end of the civil year, the first day of the next year has to be 5 days later in the Sacred Calendar. Thus, for example, if all the months in one civil year start with Ak'bal, then all the months in the next civil year will start with Lamat (because Lamat is five days after Ak'bal in the Sacred Calendar). Then, in the next civil year, all the months will start with Ben (because Ben is five days after Lamat in the Sacred Calendar). In the next civil year, all the months will start with Etz'nab (because Etz'nab is five days after Ben); and in the next civil year all the months will once again start with Ak'bal.

A rare glyph from Quirguá, Guatemala signifying one winal