NEW LOOK AT THE MODERN CODIFICATION OF THE MAYAN CALENDAR

By Kaldarkhan Aliseituly Kambar

Abstract

This document first introduces the Mayan calendar and then explains new ideas about the Mayan calendar that may have appeared in a missing codex. These ideas are influenced by a similar calendar used in central Asia and obtained through the oral tradition of Kazakh nomads. This calendar which uses a 273-day cycle instead of a 260-day cycle is explained in detail. This gives rise to the idea that the Mayan calendar had a 364-day cycle and this idea is explored in detail. In particular the idea that the Mayan long count used multiples of 364 days instead of 360 days is explored with respect to astronomical events.

In particular, the author codifies the Mayan calendar with the help of "amal", consisting of 9.1 days (for Kazakhs) and 18.2 days (for Maya), which are divided into 273 and 364 days without a remainder.

From the set of equations given in this document, one can see the close relationship of the Mayan calendar with the sidereal and synodic rotations of the planet of the solar system, the eclipses of the Moon and the Sun, and also the coverings (occultation) of the Pleiades by the Moon.

Personal introduction

I do not speak or write in English. This is my main flaw. There was a little doubt that the translators accurately translated my words and thoughts first from Kazakh into Russian, and then into English. Therefore, I apologize in advance to the readers for the incorrectly translated expressions, as well as for ambiguous words, which I wanted to express in another way. Nevertheless, I believe that the topic of the article is quite interesting and excites many people, especially those who are engaged in studying the Mayan calendar. I always expected that one of the world-renowned scientists would write on this topic as I had assumed about Mayan calendars. But, the years go one by one, but no one has written about it. But I forced myself to drop all fears aside and take a pen and write it myself. I write this article in the hope that at least someone will pay attention to it. Arguing about the mistakes made deep in the roots of the study of the Mayan calendar, which began more than a century ago, I think so: There is nothing so good that there were no mistakes in it. After all, without errors we will never know the truth...

MODERN CODIFICATION OF THE MAYAN CALENDAR

Quotation on the topic:

The famous astrologer John Dee used an Aztec obsidian mirror to see into the future. We may look down our noses at his ideas, but one may be sure that in outlook he was far closer to a Maya priest astronomer than is an astronomer of our century. J. Eric S. Thompson [1]

Mesoamerican civilization

Mesoamerican civilization was a complex of indigenous cultures that developed in parts of Mexico and Central America prior to Spanish exploration and conquest in the 16th century. Mesoamerica is an important historical region and cultural area in the Americas, extending from approximately central Mexico through Belize, Guatemala, El Salvador, Honduras, Nicaragua, and northern Costa Rica, and within which pre-Columbian societies flourished before the Spanish colonization of the Americas in the 15th and 16th centuries. It is one of six areas in the world where ancient civilization arose independently, and the second in the Americas along with Norte Chico (Caral-Supe) in present-day northern coastal Peru. [2] [3]

Mayan Astronomy
The Mayans were not only a great agrarian culture but they excelled in architecture (building some 60 or more cities which flourished during the ancient ages), language, mathematics and also astronomy. [4] Conquistadors such as Hernan Cortez not only destroyed much of the physical aspects of the civilizations in a meticulous fashion, but also the priceless knowledge that the Mayans gathered over thousands of years and recorded in their books. Diego de Landa, was another such figure who went about his job of converting the indigenous population into Christianity and destroying the native beliefs and culture. He is widely considered to be the single reason why there are so few of original Mayan texts in the world. [4] In his conviction of the superiority and absolute truth of Christianity, De Landa wrote: «We found a large number of books in these characters and, as they contained nothing in which were not to be seen as superstition and lies of the devil, we burned them all, which they regretted to an amazing degree, and which caused them much affliction». [5] Ironically, Landa himself played an important role in the understanding of the Mayan culture and their religion as well. His book «Relación De Las Cosas De Yucatán» is considered by scholars today as the foremost expert commentary on ancient Mayan culture and their religion. [4] That was confirmed only by the work of Soviet linguist Yuri Knorozov in the 1950s and the succeeding generation of Mayanists. [6]

With their destruction, access to the history of the Maya and opportunity for insight into some key areas of Maya life was greatly diminished. There are only three codices whose authenticity is beyond doubt. These are:
The Dresden Codex also known as the Codex Dresdensis (74 pages, 3.56 metres [11.7 feet]); [7]
The Madrid Codex, also known as the Tro-Cortesianus Codex (112 pages, 6.82 metres [22.4 feet]);
The Paris Codex, also known as the Peresianus Codex (22 pages, 1.45 metres [4.8 feet]).
An alleged fourth codex remains (as of August 2017) controversial: The Grolier Codex, also known as the Sáenz Codex. [8]

Background
The two most widely used calendars in pre-Columbian Mesoamerica, were the 260-day Tzolk'in and the 365 day Haab'. The equivalent Aztec calendars are known in Nahuatl as the tonalpohualli and Xiuhpohualli. The combination of a Haab' and a Tzolk'in date identifies a day in a combination which does not occur again for 18,980 days (52 Haab' cycles of 365 days times 73 Tzolk'in cycles of 260 days, approximately 52 years), a period known as the Calendar Round. To identify days over periods longer than this, Mesoamericans used the Long Count calendar. [9] Historian Cyrus Thomas (1825-1910, U.S. ethnologist and entomologist) made a connection between the codex and the 260 year cycle ("Ahau Katun") of the Maya calendar and the 365 days in a year. [10][11][12][13][14] Ruggles shows that in the codex the Maya related their 260-day calendar to celestial bodies, especially Venus and Mars. [15]

819-day count of the Maya calendar
819-day count: Some Mayan monuments include glyphs that record an 819-day count in their Initial Series. These can also be found in the Dresden codex. [16] This is described in Thompson. [17] More examples of this can be found in Kelley. [18] Each group of 819 days was associated with one of four colors and the cardinal direction with which it was associated – black corresponded to west, red to east, white to north and yellow to south. [9]

Correlations between Western calendars and the Long Count
The Maya and Western calendars are correlated by using a Julian day number (JDN) of the starting date of the current creation – 13.0.0.0.0, 4 Ajaw, 8 Kumk'u. [n 4] This is referred to as a correlation constant. The generally accepted correlation constant is the Modified Thompson 2, "Goodman-Martinez-Thompson", or GMT correlation of 584,283 days. Using the GMT correlation, the current creation started on September 6, −3113 (Julian astronomical) – August 11 in the Proleptic

Gregorian calendar. The study of correlating the Maya and western calendar is referred to as the correlation question. [19][20][21][22][23] The GMT correlation is also called the 11.16 correlation.

Long Count periods

The Long Count calendar identifies a date by counting the number of days from a starting date that is generally calculated to be August 11, 3114 BCE in the proleptic Gregorian calendar or September 6 in the Julian calendar (or −3113 in astronomical year numbering). There has been much debate over the precise correlation between the Western calendars and the Long Count calendars. The August 11 date is based on the GMT correlation (see Correlations between Western calendars and the Long Count calendar section elsewhere in this article for details on correlations). [24]

The Muisca calendar

The Muisca had the word zocam to denote the concept of year, which they always used in combination with a number: zocam ata, "year one", zocam bosa, "year two". Following the works of Duquesne, three types of years were used; Rural years, Common years and Priest's years. The years were composed of different sets of months: The Rural Year contained 12 synodic months.
The Priest's Year composed of 37 synodic months, or 12 + 12 + 13 synodic months (the 13th was a leap month, called "deaf" in Spanish).
The Common Year composed by 20 months, making a full common Muisca year 600 days or 1.64 times a Gregorian year. [25] [26] Izquierdo suggests, however, that this year, unlike the Rural and the Priest's years, was based on the sidereal lunar cycle. [27] [28]

The Incas calendar

Despite the uncertainties, further research has made it clear that at least at Cuzco, the capital city of the Incas, there was an official calendar of the sidereal–lunar type, based on the sidereal month of 27 1/3 days. It consisted of 328 nights (12 × 27 1/3) and began on June 8/9, coinciding with the heliacal rising (the rising just after sunset) of the Pleiades; it ended on the first Full Moon after the June solstice (the winter solstice for the Southern Hemisphere). This sidereal-lunar calendar fell short of the solar year by 37 days, which consequently were intercalated. This intercalation, and thus the place of the sidereal-lunar within the solar year, was fixed by following the cycle of the Sun as it “strengthened” to summer (December) solstice and “weakened” afterward, and by noting a similar cycle in the visibility of the Pleiades. [29]

NEW LOOK AT THE CONTEMPORARY CODIFICATION OF THE CALENDAR OF MAYA FROM ANOTHER POINT OF VIEW OF THE AUTHOR...

At the beginning of the article, I wrote briefly the whole essence of the Mayan calendar, the Aztecs, the Incas and Muisca, which we know today. This 260-day "Tsolkin" (Aztec: "Tonalpohually"), 365-day "Haab" (Aztec: "Xiuhpohualli"), 819-day account and a chronological calendar of long periods, as well as the problem of the correct definition of the beginning of the "zero year" (August 11, 3114 BCE in the calendar of the proleptic Gregorian calendar) of the Mayan calendar (literature from [9] to [24]).

If I confess honestly, I only recently began to study the complex hieroglyphs of the Maya on the Dresden Code. [7] Really very difficult occupation. In the eye immediately rushes that all these entries in the drawings are only "pieces" of something "huge", which we have irretrievably lost. When I look at the pictures of Maya, gradually my thoughts become purer and cleaner. Since I was fond of arithmetic since childhood, it was easier for me to figure out the figures. To be clear to the readers, in this article all the equations without exception are composed with the help of basic arithmetic operations (addition, subtraction, multiplication and division). It seems to me that the Mayan priests were more interested in not only the 260-day year "Tzolk'in", but also with some short days, behind which lies the "whole mystery" of the Mayan calendar. With the help of these

two and three-digit figures, the Mayan priests determined the magnitude of the month and year, the synodic and sidereal values of all visible and invisible planets of the Solar System (symbol ⏣) and much more. To be more precise in expressions, I reinforce them at the end of the article with the tables that I compiled myself. Using elementary formulas and algorithms using the program "Microsoft Office Excel", you can turn certain Maya numbers into infinite astronomical and mathematical quantities and equalities, as in **Table 1**. However, one should not forget that some of these "magnitudes" are a simple coincidence, that is, the possibility of Mayan astronomers cannot be overstated, because they did not have computers or powerful telescopes.

In order not to get confused in the calculations, Mayan astronomers processed the number system with two and three digits. Basically they were engaged in observing the sky. Only when these calculations and observations coincided, they increased these figures to billions (possibly trillions) days with the help of a geometric progression.

Further in this article I will give only my data and calculations taken from my hand-written book "About calendars of ancient nomades and kazakhs". [30] If I'm wrong, please correct me. If it seems to you that I insult your honor and dignity - sorry, I did not want to say this.
Residents of Maya, like other ancient cultures of the world, with fear awaited each Lunar and Solar eclipse. In the modern world, this phenomenon of the sky is perceived as an amusing sight, since astronomical science preliminarily notifies about it several years in advance.
The Mayan priests also tried to do this and they did it well:
1. 260 days × 4 = 1,040 days = 3 × 346.6666667 (346 d 16 h 0 min 0 s) days

Draconic year is associated with eclipses: these occur only when both the Sun and the Moon are near these nodes; so eclipses occur within about a month of every half eclipse year. Hence there are two eclipse seasons every eclipse year. The average duration of the eclipse year is 346.620075883 days (346 d 14 h 52 min 54 s) (at the epoch J2000.0). [31]

However, the modern codification of the Maya is made up of equations closely related to the Sun and its visible planets:
2. 260 days (Tzolk'in) × 73 = 18,980 days = 52 × 365 days («Haab')

If I'm not mistaken, for the first time this equality appeared in 1894 in Cyrus Thomas (Mayan Year). [12]

According to the hypothesis of the author of this article, this cycle was used to combine the solar year and lunar months into one common cycle, however, in the "Long Count periods" this equality was not used at all. I will write about this at the end of the article.

If we need a year in the Mayan calendar, which is close to the tropical year, then we do not need to wait for all 52 years. I'm sure that with this task, Mayan astronomers can cope with smaller numbers:
3. 260 days × 59 = 15,340 days = 42 × 365.2380952 (365 d 5 h 42 min 51.43 s) days

The mean tropical year is approximately 365 days, 5 hours, 48 minutes, 45 seconds, using the modern definition, (= 365.24219 days of 86400 SI seconds). [32]

Agree, the equality of 42 years by the number of days is much less than the 1507 year cycle:
4. 260 days × 2117 = 550,420 days = 1507 × 365.2422 (365 d 5 h 48 min 46.34 s) days

The occurrence of a particular solstice on a given date in the "Haab'" will repeat after the passage of 1,508 365-day "Haab'" years. The "Haab'" will lose one day every 1,508 days and it will take 1,508

"Haab'" years to lose one "Haab'" year. So 365 x 1,508 = 365.2422 x 1,507 or 1,508 "Haab'" years = 1,507 Tropical years of 365.2422 days. [33]

By the way, if we want the 260-day year "Tzolk'in" to be compatible with the Julian year (July year [34]), then we will have to wait a very long time:
5. 260 days × 1461 = 379860 days = 1040 × 365.25 days

However, in nature there is one more equality, in which the number of days is about ten times less than 18,980 days:
6. 260 days × 7 = 1,820 day = 5 × 364 days

In our opinion, it was this equality that played a key role in the codification of "Long Count periods" which merged with this equality:
7. 260 days × 28 = 364 days × 20 = 1820 days × 4 = 7280 days = 21 × 346.6666667 days

Therefore, in all the known mathematical codifications of Mayan astronomy, these equations often appear, but, paradoxically, they are still not interpreted correctly.
For example, one of the Maya calendar researchers sees this equality (from 1820 days), but tries to codify it using "Haab'" 365 days. [35] Because of these and other mistakes similar to it, the meaning of these amazing (6th and 7th) equalities remains unsolved to this day.

Mayan astronomers (perhaps before them in the times of the Olmecs and Zapotecs) used the 260-day "Tzolkin" to preliminarily calculate the eclipse of the Moon and the Sun, but the 364-day "???" year was used to pre-calculate the occultation of the Pleiades by the Moon.

Another feature of Maya priests was that they strictly followed that the main number of days in certain cycles was always divided into a sacred number – seven (7) without a remainder. Probably, this is due to the fact that the Mayan priests were also well aware of the phases of the Moon, which approximately every 7 days changed its external form. Proof of this are the sets of equality that are divisible by 7 without remainder. In addition, the number "7" is associated with the "Haab'" of 365 days, but more on that later ...

We see that in ancient times 260 days and 364 days in Mesoamerica had a huge impact. Mayan priests cannot be considered retarded or illiterate, because they used 364 and 260 days in "Long Count periods", and not 360 days, as we are used to now. There is a mutual misunderstanding here...

They very accurately and skillfully compensated for the absence of one (1) day in the 364 days of the year, tracking the time not as we are now used to. In this article, we'll talk about this.

Of course, I can be mistaken, but the irony is that the Mayan priests were not obsessed with equinoxes, precessions, nutations, the "Milky Way" galaxy and others, as some researchers usually like to attribute to them, having read various books of modern astronomy.

Astronomers and priests who lived before Maya, with them and after them, talked about time and space very simply, but rationally, that ultimately "invisible time" would benefit society. It could not be otherwise!

When Maya researchers, as well as inquisitive readers at a basic level, begin to study the motion of the Moon ([36] [37] [38] [39] [40] [41] [42]), they will easily understand the secrets of astronomy and Mayan calendars. [30, p. 732-735]

In the truthfulness of my words, I will give an example. "819-day count" in some sources is associated with Jupiter [43], and with different colors. [44] The 819-day count can be described several ways: Most of these are referred to using a "Y" glyph and a number. Many also have a glyph for K'awill – the god with a smoking mirror in his head. K'awill has been suggested as having a link to Jupiter. [43] In the Dresden codex almanac 59 there are Chaacs of the four colors. The accompanying texts begin with a directional glyph and a verb for 819-day-count phrases. Anderson [44] provides a detailed description of the 819-day count.

It will not be necessary to be a brilliant astronomer or mathematician to see that the "819-day count" is closely related to the sidereal month: [37]
8. 364 day × 9 = 3276 day = 4 × 819 days and 819 days = 30 × 27.3 days

The sidereal month is defined as the Moon's orbital period in a non-rotating frame of reference (which on average is equal to its rotation period in the same frame). It is about 27.321661547 days (27 days, 7 hours, 43 minutes, 11.5577 seconds). It is closely equal to the time it takes the Moon to pass twice a "fixed" star (different stars give different results because all have a very small proper motion and are not really fixed in position). [45]

In turn, the sidereal month is the basis of the lunar-stellar calendar, similar in structure to the modern luni-solar calendar based on the synodic month. The lunar-stellar calendar (actually the fourth kind of calendar) in ancient times was one of the main calendars of the whole civilization of mankind. Lunar (1), solar (2) and luni-solar (3) calendars appeared after him. To our great regret, modern science, [45] and all of us have lost the "golden key" to this amazing calendar. The lunar-stellar calendar in all the famous ancient civilizations was based on the occultation (togys) of the Pleiades by the Moon. (Some deep-sky objects, such as the Pleiades [M45], can also be occulted by the Moon). [41]

I guess I do not have the right to say that I'm on the right track. However, deep in my soul, also in the drawings of the Dresden Code, I see that the Mayan calendar is directly connected not only with the eclipse of the Moon and the Sun, but also with the Moon covering the Pleiades (Occultation of the Moon and the Pleiades). Tracking time on the Pleiades coverings by the Moon is a very complex topic, but it is solvable or rather a completely solved theme to the smallest detail. [30, pp. 325-607]

During the last 33 years (1985-2018), the author tried to understand the calendars of his ancestors, that is, the nomads of Central Asia. The excerpts and principles of the work "Urker esebi" (literally "the Pleiades calculations") and "Togys esebi" (literally "Occultation calculations"), which were transmitted over many millennia, reached this generation only verbally and in a deplorable state.
Despite this, compared to the Mayan calendar, "Urker esebi" and "Togys esebi" **(further – UE and TE)** were much more fortunate. They were not preserved on paper, which could be destroyed by fire [4] [5], they were preserved in the deep consciousness of the nomads. Today with the help of UE and TE we will try to solve some secrets of the Mayan calendar.

Brief introduction
I believe that compared with Western researchers studying the Mayan calendar, I had some advantage.

Firstly, I am a descendant of nomads who, from ancient times, lived in the endless deserts of Kyzylkum (Southern Kazakhstan), and I often visited these native lands of my ancestors. And also important is the fact that in my youth I often saddled camels and horses to graze cattle, and at night

looked at the mighty starry sky from the dome of the yurt (kyiz ui – house of felt). [46] In a word, I grew up among the topic I researched and knew everything from the inside.

Secondly, I know my native Kazakh language not from distorted translations of researchers, but from the original, from which all our nomadic history, culture, literature and, of course, the calendar are felt.

Thirdly, the village in which I lived was not far from the vast ruins of ancient cities such as Otyrar-Farab (GPS: 42°51'9.04"N 68°18'12.09"E), the native city of the great scholar Abu Nasir al-Farabi (known in the West as Alfarabius, 872-950). Like many of my peers, since childhood I have been striving for knowledge, like our great countryman, and to my happiness, during the USSR received excellent knowledge both in school (1970-1980) and at university (1985-1990).

In addition, my stern father, Aliceit Kambaruly Baykabil-kaji tags (1922-2003), was a man who survived the great famine of 1932-1933, in which 66 percent of Kazakhstan's population died, as well as one surviving soldier among many of his peers in the Great War of 1941- 45 years. It is gratifying that the father knew very well and, in parallel with the Gregorian calendar, conducted the lunar-stellar calendar of the nomads UE and TE. Seeing my desire to learn the ancient calendars of my ancestors, he willingly told me that he himself knows and that his nomadic ancestors knew about him. When my father first showed me the full occultation of the Moon and the Pleiades, I was only 9 years old (18.12.1972, UT 17:20). My impression of the seen picture of the sky, left a deep imprint on my soul for life.

My sweet mother – Apajan Saduakaskyzy Jakashtegi (1929-2002) graduated from the Pedagogical Institute in Mathematics. Over time, she invented her "mathematic", simplifying modern complex mathematics to my childish level. This knowledge of mathematics has been useful to me in my life, and also in my research. The various interesting equations presented in this article are the fruit of my mother's mathematics, which she coined and instilled into me in her childhood. All these and other factors that occurred in my life eventually made me thoroughly study and write this fundamental work.

For clarity of the chosen topic, I advise you to familiarize yourself with the text of the lunar-star calendar of the nomads UE and TE in English, which found with difficulty on the Internet: «IV. The star calendar, based on the sidereal cycle of the Moon, in practice is used very seldom. It is also the most ancient calendar. Such calendar under the name togys (from kazakh togysu meaning «to intersect» [occultation]) were used by Kazakhs. The beginning of months coincides with the moment when the Moon passes the Pleiades and the names of months correlate with lunar phases. As the difference between the synodic and sidereal cycles of the Moon is about 2 days, each subsequent meeting of the Pleiades and the Moon occurs on a lunar phase that is 2 days earlier than the previous lunar phase. There is a certain relation between the names of togyses months and seasons. So, for example, in the spring such «meetings» occur on the 5th, 3rd, 1st days of a lunar month, in the winter – on the 11th, 9th and 7th days. The beginning of a year in this calendar coincides with the month when the waxing (young) Moon meets the Pleiades. This usually occurs in a period between the end of April and the beginning of May. In an ancient Kazakh star calendar there are 13 such «meetings» [occultation] in a year from which only 11 are visible. If every month contains 28 days then the duration of the year is 364 days». [47] [48]

Of course, from this brief description of the so-called lunar-stellar calendar of nomads, not everything is clear. Different questions arise. Therefore, I will give a brief arithmetic theory of the ancient UE and TE:

1. 273 days × 4 = 1,092 days = 3 × 364 days
2. 28 days × 39 = 1,092 days = 40 × 27.3 days

3. 28 days × 27 = 756 day, 756 days + 9 days = 765 days = 28 × 27.32142857 day
4. 280 days × 390 = 109,200 days = 300 × 364 days
5. 273 days × 400 = 109,200 days = 299 × 365.2174 days
6. 273 days × 487 = 132,951 days = 364 × 365.25 days
7. 273 days × 113 = 30,849 days = 89 × 346.6179775 day [30, pp. 185-191]

These equalities were invented by nomads who lived up to modern Kazakhs (Saki [Scythian], Sarmatians, Huns, Turkis and present turkic-speaking peoples and nationalities).

If I say that the entire territory of present-day Kazakhstan is covered with ancient burial mounds (megaliths, dolmens, menhirs, cromlechs, cairns, seidas and others), this is not slyness, not a distortion of facts. For today in Kazakhstan there are about 35 thousand architectural, archaeological and historical monuments. [49] Among them, some archaeoastronomical objects are of value not only for domestic, but also for world science. In my work, I devoted the first section to this topic, and also pointed out the exact coordinates ("Google Maps" and "Google Earth" [50]) of some important objects in terms of science. Any reader can view these images from space, reducing the height to a minimum. [30, pp. 1-124]

First had to understand UE and TE himself, and then have to explain to others. That's where I was really helped by the "ancient" knowledge of my father, received verbally from my ancestors. 1985, when I entered the faculty of journalism, began an independent study of UE and TE in Almaty (GPS: 43°13'5.61"N 76°55'18.93"E). Seeing my persistence in these studies, the joker Zhumabai gave the nickname "Patriarch of all calendars."

However, despite these and other efforts, the understanding of the main UE and TE came only after 30 years. I only now began to understand the "forgotten language" not only of UE and TE, but of other ancient calendars, such as the calendar of ancient Rome, right up to the Gregorian calendar. Among all the ancient calendars, the mysterious Mayan calendar stands apart from the others.

Like the 260-day Mayan calendar, the 273-day UE and TE are also closely related to the entire solar system. In order not to be unreasonable, I will give my own example in **Table 2**. When I saw that the 273-day year was closely related to the 819-day calendar, I began to pay attention to the Mayan calendar. Over time, when I began to study the Mayan calendar, I found a more interconnected equality:
1. 273 day × 3 = 819 days & 819 days × 4 = 3,276 day = 9 × 364 day
2. 273 day × 20 = 5,460 day = 21 × 260 day
3. 364 day × 15 = 5,460 day = 15.75 × 346.6666667 day
4. 273 day × 80 = 21,840 day = 84 × 260 day
5. 364 day × 60 = 21,840 day = 63 × 346.6666667 day
6. 1,040 day × 21 = 21,840 day = 12 × 1,820 day
7. 1,092 day × 20 = 21,840 day = 3 × 7,280 day etc. [30, pp. 187, 744]

The contact points between the Mayan calendar and the UE and TE do not end with this equality.
Back in 1985, when I read about Maya's calendar from S.I.Seleshnikov's book [51, 147-159], I was surprised that I understood some of the Maya words without translation. For example, "k'in" and "tun" in the Kazakh language are translated exactly as "kun" (Sun or day) and "tun" (night), as well as "Katun" (katyn – woman) "Quirigua" (quiryk – tail), "baktun" (night of happiness), "kalabtun" (the desired night), kinchiltun "kunshilde" (hot days), alautun (fiery night), "tzolk'in" sol kun (that day), "sotz" soz (a word), a mole (a lot), a "saq" a sac-skiff (the ancestors of Kazakhs), "k'ank'in" kan kun (bloody day), "k'uk" kok (green), "yaxchilan" (jas jilan – young snake) and others. In addition to these words, among the names of 20 days and the associated glyphs in **Table 3**, I can distinguish several words similar in sound and meaning. After such a similarity of different words

and others, slowly but surely: "I am tormented by vague doubts" [52], about the correctness of such a statement " It is one of six areas in the world where ancient civilization arose independently", [2] [3] i.e. the denial of "Asian origin" in the Mayan culture. We hope that linguists will better understand the similarity of words between the sedentary culture of the Maya (Central America) and the nomadic culture of the Turkis and Kazakhs (Central Asia). [30, p. 744]

In accordance with my observations over the past 30 years, the above 260, 273 and 364 day calendars still operate correctly and reliably. Scientist of the Hydrometeorological Center of Russia N.S.Sidorenkov in his book proves this by scientific methods and writes: "It is well knownthat the effect of terrestrial zonal tides withina lunar month (27.3 days) leads to four modes with different period lengths in the Earth.s rotation: two acceleration periods of lengths m1 and m3 and two deceleration periods of lengths m2 and m4. The modes alternate with an average period of mi ≈ 27,3 / 4 = 6,8 days. However, since the lunar perigee and nodes move, this period varies from 5 to 8 days. In 2006, for example, deceleration was observed from September 29 to October 6; acceleration, from October 6 to 12; deceleration, from October 12 to 19; and acceleration, from October 19 to 27. Thus, the lunar month consisted of four intervals with a total duration of 7 + 6 + 7 + 8 days. Any combinations and any real values of mi in the range of 5 to 8 days are possible. The only unchanged characteristic is a monthly period of 27.3 days. ... Solar tides give a maximum correlation at a shift of 365 days, while lunar tides give a maximum correlation every sidereal month. Therefore, a maximum ACF is observed at a shift of 355 days (13 sidereal months). A large ACF maximum also occurs at a shift of 382 days (14 sidereal months)". [53]

Together with the cycles 260, 273 and 364 days, mankind can merge with the nature of the Earth and with the rhythm of an infinite cosmos. I live with this rhythm for a long time, but this is just my personal opinion, and I'm not going to impose this opinion on anyone else...

Peter Meyer the creator of Hermetic Systems calendar software and calendar studies [54] wrote about the Mayan calendar, especially about "Long Count periods": **The Maya Calendar (Chapter 2: The Correlation Problem)**
"Of all the problems dealt with by Maya scholars, the so-called correlation problem is the most fundamental. It is only a solution to this problem which allows us to locate the phenomenon of the Maya civilization in a time-frame that relates to our own. The correlation problem is the problem of finding a particular day which is identified both by a Western date and by a Maya date, allowing the Western date to be equated with the Maya date. Once this is done, conversion from any date in one system to a date in the other becomes possible. Without a solution to this problem we may be able to determine that the great ruler of Palenque, Lord Pacal, died on 9.12.11.5.18 6 Edznab 11 Yax, but whether this was before or after the fall of Rome or the coronation of Charlemagne, and by how much, would remain unknown". [22] In this quote Peter Meyer I see a rational grain, and therefore I fully support it.

The Mayan and Aztec priests in obsidian mirrors really saw many things that modern astronomy does not see at all. [1] **Table 4** shows "Long Count periods" for the Mayan calendar compiled by the researchers. In my personal opinion, the fourth column of the table should look like the third column with rounded figures. Instead, we see not rounded years.

Tables 5 and 6 show my version of "Long Count periods". Unlike Table 4, in these tables, rounding has all the numbers except one, the one that immediately catches your eye. On the second column of the table, instead of "20 K'in", a completely incomprehensible "18.2 K'in" appeared, and "20 Vinal" appeared in place of "18 Vinal". Because of these changes, the amount of "1 Tun" becomes equal not 360 days, but 364 days. Where did this incomprehensible "18.2 days" or "9.1 days" come from?
1. 18.2 days × 5 = 91 days × 4 = 364 days

2. 0.2 day = 4 hours 48 minutes
3. 4 hours × 5 = 20 hours
4. 48 minutes × 5 = 240 minutes = 4 hours
5. 20 hours + 4 hours = 24 hours

In addition to all the above, could Mayan priests be able to divide the day into 5 parts, equal to 4 hours and 48 minutes? For example, Kazakhs still divide the day into approximately 10 equal parts, dividing this time interval into "shak" (hour) and "mezet" (minutes):
1. 9.1 days × 10 = 91 days × 4 = 364 days
2. 0.1 day = 2 hours 24 minutes (title: "Et pisirim uakyt")*
3. 2 hours × 10 = 20 hours
4. 24 minutes × 10 = 240 minutes = 4 hours
5. 20 hours + 4 hours = 24 hours
**Approximately, the time interval equal to 2 hours 24 minutes is called: "Et pisirim uakyt" (enough time to cook meat).*

18.2 and 9.1 days in **Tables 5** and **Tables 6** acts as the fundamental basis for "Long Count periods". To choose them as the main one, I was motivated by my father's "ancient" calculations. 9 days he called "amal", and 40 days "shilde" (Chilla – translated from Farsi "forty days"). Türkic and Kazakh "Esepshi" (Man leading the score of time) [30, p. 445-453] skillfully used the 9.1-day "amal" (9 days 2 hours 24 minutes) in everyday life.

The word "amal" does not come from the Arabic word "Hamal" (month – March), as some Kazakh researchers of antiquity suggest. In everyday life, the word "amal" means – action, deed, resourcefulness, reception, method, cunning. Even in the Kazakh scientific community the word "amal" is used as a synonym for strictly scientific words "arithmetic action, algorithm, equality" and others.

At the dawn of Kazakhstan's independence, an inconspicuous article was published in one of the republican magazines in the Kazakh language. This article briefly described another kind of ancient Kazakh calendar called "Togyz tarmak" (Nine knee) or "Togyz shilde" (Nine Shilde):
40 days per shilde × 9 shilde = 360 days & 360 days + 5 konak (a guest) = 365 days [55]

But in my rightness I was finally persuaded by the ancient game of nomadic Kazakhs "Togyz Kumalak" ("Nine small round stones"). [56] In this game, the numbers consisting of 9 and 18 are clearly shown. This board game with simple rules, in fact is a very complex intellectual game. The game board consists of – 2 boilers, 18 nests (9 + 9) and 162 "kumalak". At the beginning of the game, each player owns eighty-one "kumalak", located on 9 nests. Each nest has 9 kumalaks each.
Then begins a complex game. Its rules can be found at this link (in Kazakh). [57] If one of the players dials 82 "kumalak", the game immediately stops, and the player who gets 82 "kumalak" is declared the winner. This implies the simplest equality of UE and TE:
1. 81 days ÷ 3 = 27 day & 82 day ÷ 3 month = 27.3333 day;
2. 81.9 days ÷ 3 = 27.3 day (819-day count the Maya).

However much we change these numbers from 9 and 18, we always end up with the approximate value of the sidereal month:
9.1 day + 9.1 day = 18.2 day & 18.2 days + 9.1 day = 27.3 days [53]

A reasonable question arises: why did the nomads of Central Asia choose the 9.1-day "amal", and the Maya people from Central America chose the 18.2-day "amal"?

The fact is that the nomads of Central Asia lived in the northern hemisphere, where the climate is sharply continental in nature. In these severe regions, four seasons (spring, summer, autumn, winter) are clearly expressed for 91 days each:
9.1 days per amal × 10 amal = 91 days & 91 days per season × 4 seasons = 364 days.

As we all know, Mesoamerica was close to the equator (tropical zone), so Maya could easily divide the solar year into a hot and cool period, each of which contained 182 days:
1. 18.2 days × 5 = 91 days & 91 days × 4 = 364 day
2. 18.2 days × 10 = 182 days & 182 days × 2 = 364 day.

Mysterious figures "9" and "18", sometimes called "amal", sometimes "shilde," always confuse researchers.
1. 40 days × 5 shilde + 41 day × 4 shilde = 200 days + 164 day = 364 day (Central Asia)
2. 20 day × 10 shilde + 21 day × 8 shilde = 200 day + 164 day = 364 day (Central America)
3. 9.1 day × 40 amal = 364 day = 20 amal × 18.2 day

In order to demonstrate the correctness of this assertion, we compiled **Table 7** and everything fell into place. The 1st and 5th column of Table 7 contains from 1 to 45 "amal". The 2nd and 6th column of Table 7 contains from 18.2 and 9.1 days to 819 days and 409.5 days. The 3rd and 7th columns in Table 7 contain 30 and 15 sidereal months corresponding to the 2nd column. The 4th and 8th columns in Table 7 contain sidereal months of 27.3 days, formed every 2 months for the Mayan calendar and 1 month for UE and TE.

As the number of 18.2 days (the 2nd column) and 9.1 days (6th column) increases, in Table 7, 20 and 40 "amal" (1st and 5th column) are formed, which is exactly 364 days (364 days ÷ 13 months = 28 days) and 21 and 42 "amal", which is exactly 382.2 days (382.2 days ÷ 14 months = 27.3 days).

As a result of these seemingly simple mathematical calculations, we see that in the 1st and 5th columns of Table 7 there appear 20-21 and 40-41 amals, which, in turn, correspond to the 13th and 14th sidereal months on the 3rd and 7th columns of Table 7.

Thus, it becomes clear that the 20 names in Table 3 are not the names of the days that we still consider, but the names "amal" in accordance with Table 7.

In our case, the Maya priests and Kazakh "esepshi" from one and two-digit number with a fraction "gave birth" to the whole number of "amal", sidereal months and the star-solar year, which were used in "Long Count periods"!

Maya researchers who did not know this algorithm from Mayan mathematics still multiply the numbers **20 days × 13 months = 260 days** or **20 days × 18 months = 360 days**. Modern "technological" science still does not understand this seemingly "wild and cave" and at the same time complex mathematics of the Maya. [30, p. 744]

In addition, we can add that the number 18.2 day perfectly combines with the values of the solar year in very short periods, compared with 260 day:
1. 18.2 days × 301 ≈ 5,478 days = 15 × 365.2 days = 201 × 27.25373134 days
2. 18.2 days × 582 ≈ 10,592 days = 29 × 365.2414 = 388 × 27.29896907 days
3. 18.2 days × 602 ≈ 10,956 days = 30 × 365.2 days = 401 × 27.32169576 days
4. 18.2 days × 883 ≈ 16,071 days = 44 × 365.25 days = 589 × 27.2852292 days
5. 18.2 days × 5,880 = 107,016 days = 293 × 365.24232 days = 3917 ×27.32091 days

Who has not yet understood the meaning and purpose of the Mayan calendar, perhaps still bewildered about the "missing" 1st day, which should be added to the 364 days. Well, well, let's see, this question from the other side!

In fact, this question is only on our head, so to speak, thanks to modern science. Very rarely it happens that the solar year ends exactly after 365 days. We often notice that in March or even in April it's still cold, and in November and December there should be snow and frosts, but it still remains abnormally hot and so on. The spring or autumn equinox of day and night does not mean that at this very moment a warm spring or cool autumn will come. Thus, the sky and nature shakes the seasons of the year for thousands of years. Everything in nature is subject to certain laws and rhythms. Our planet has planetary rhythms that affect all living creatures on Earth, including humans. The life of nature and man is subordinated to cosmic rhythms. When we begin to live so that our own rhythms come into resonance with the rhythms of nature, our body acquires unprecedented power. During Genghis Khan, such a rhythm operated, but then his descendants lost this "sacred" rhythm.

If we start using the year not 365.2425 days, but 364 days, which is convenient for us as an "eternal calendar" (which is divided into 7, 13, 28, 91, 182 without remainder), we will feel a difference of 28 days between them every 23 years. According to my father, it became clear to me that the Kazakh "esepshi" does not add a difference of 28 days every 22 and 23 years. They simply transferred the beginning of spring or autumn to the corresponding 28 days and continued to live for the selected 364 days, until for 293 years it all started from the very beginning:
1. 23 years × 13 = 299 years & 299 × 365.2174 days = 109,200 days
2. 364 days × 300 = 109,200 days = 4000 × 27.3 days
3. 300 years ÷ 25 = 12 years (Turkic-Kazakh 12-year animal cycle)

From tables 5 and 6 we see that the Maya priests chose this period as 20 and 400 years.
364 days × 400 = 145,600 days = 399 × 364.9123 days
Attentive for certain have noticed: in this equality absolutely other rhythms and calculations can appear.

There is one important point in the Mayan calendar. The beginning of the year of the 364-day calendar cannot be determined by any date, which is not related to the rhythm and laws of nature. Therefore the Mayan priests searched for such an "important and meaningful" day, which would ensure the merging of the Maya with the harmony of the universe. They even left this "hint" in the form of different steles (a stone pillar) with hieroglyphs in many places throughout Mesoamerica. Located in the southeast of Guatemala, Quirigua is the site of archaeological excavations of ancient Mayan culture. [58]

In the eastern side of the stele C (Quirigua) is written the mythical date of the creation of 13 baktuns, 0 katuns, 0 tun, 0 uinals, 0 kins, 4 Ahau 8 Kumku. This is referred to as a correlation constant. The generally accepted correlation constant is the Modified Thompson 2, "Goodman–Martinez–Thompson", or GMT correlation of 584,283 days. [19][20][21][22][23] The GMT correlation is also called the 11.16 correlation. The correlation of GMT on the basis of "360 days" translated this hieroglyph, as Monday, August 11, 3113 BC, into the proleptic Gregorian calendar [PGC] (Monday, September 6, 3114 BC, in the proleptic Julian calendar [PJC]), which corresponds to the Julian Day Number (JDN) 584,282.5 days. [59]

What happened that day in the solar system, in the distant cosmos, in the Milky Way galaxy, or at worst in the night sky over the Maya? Nothing is known about this! But it is known that six years ago all of humanity was on the verge of a nervous breakdown due to the upcoming "Mayan Apocalypse" in connection with the end of "13 baktun" the day before December 21, 2012 on

Friday. [60] [61] [62] What can I add here, even if Almaty residents, located about 12,770 kilometers from Mesoamerica, on the eve of this date, swept away all food and drinking water from the shelves of supermarkets. Some fans of "Mayan Apocalypse" were offended and upset, why there was no "End of the World", as if it promised something good for humanity?!

Since I had a ready lunar-stellar calendar for UE and TE for 1985-2020, I knew for sure that nothing would happen on December 21, but from December 25 to December 26, 2012 on Tuesday there will be an ordinary "covering" of the Pleiades of the Moon at 13 day phase. The 370th occultation the Pleiades by the Moon passed without incident and with time humanity, which is constantly somewhere in a hurry, forgot about everything.
JDN 2456286.5 (25.12.2012) – JDN 2446178.5 (23.4.1985) = 10108 = 370 × 27,32

That's when I first thought about why the International Occultation Timing Association (IOTA) [63] did not report this?

If someone from readers can use SkyMap Online / Professional edition [64] (there is an English translation), will be able to see not only this date, but also dates relating to the "Long Count periods". The GPS coordinate of Chichen Itza, El Castillo (Kukulkan pyramide) for "Google Maps" or "Google Earth" [50] is defined as 20°40'58.90"N 88°34'7.06"W (for "SkyMap Online" 20°40'N 88°34'W"). [64] If you enter this coordinate on this "SkyMap Online", [64], and also set the specified time by UTC, [65] you will see what these dates are associated with.

After viewing "SkyMap Online" using Table 8, we can see:
1. Monday, August 11, 3113 BCE in the proleptic Gregorian calendar [further – PGC] (does not show),
2. Monday, September 6, 3114 BCE in the proleptic Julian calendar [further – PJC] (shows)
In the starry sky over Chichen Itza, El Castillo (Kukulkan pyramide) nothing happened (JDN 584,282.5 [59]), i.e. there was neither the Lunar nor the Solar eclipse, nor was the occultation of the Pleiades by the Moon, etc.

3. Friday, August 11, 3113 BCE in the PJC (shows)
4. Friday, July 16, 3112 BCE in the PGC (does not show)
On this day (JDN 584,622.5 [59]) in the starry sky over Chichen Itza, El Castillo (Kukulkan pyramide), the Pleiades were occultation in the Moon in the 25 day phase after the astronomical new moon. In the 5th and 6th rows of Table 8, to test my words, it is shown how the Moon occultation the Pleiades on December 25-26, 2012. [30, p. 744]

According to **Table 9**, when the zero (0) day corresponds to Monday, August 11, 3113 BCE in the PGC, the interval between dates is 144,000 days (360 days × 400 year = 144,000 days), and all 13 baktuns are 1,872,000 days (144,000 days × 13 baktun = 1,872,000 days ÷ 360 days = 5,200 years). This shows that 13.0.0.0.0 corresponds to Fri, December 21, 2012. CE (Gregorian date GMT (JDN 584,282.5) correlation).

According to **Table 10**, when the zero (0) day corresponds to Friday, August 11, 3113 BCE in the PJC, the interval between the dates is 145,600 days (364 days × 400 year = 145,600 days), and all 13 baktuns are 1,892,800 days (145,600 days × 13 baktun = 1,892,800 days ÷ 364 days = 5,200 years) . This shows that 13.0.0.0.0 corresponds to Fri, November 7, 2070 CE (PJC date Kambar (JDN 584 622.5) correlation).
1. 360 days × 400 × 13 = 1,872,000 days
2. 364 days × 400 × 13 = 1,892,800 days
3. 1,892,800 days – 1,872,000 days = 20,800 days ≈ 365.2425 days × 57

Comparing tables 9 and 10 with each other, we will see that the researchers of the Mayan calendar, which frightened our planet «Mayan Apocalypse», hurried for as long as 57 years! [60] [61] [62]

However, one should not forget that my version (PJC date Kambar (JDN 584 622.5) correlation) may also be incorrect. Because "13 baktuns, 0 katuns, 0 tunas, 0 uinal, 0 kins, 4 Ahau 8 Cumku" were defined by the system of accounts from 360 days (correlation according to the Gregorian date GMT (JDN 584,282.5)). If we try to determine "13 baktuns, 0 katuns, 0 tunas, 0 uinal, 0 kins, 4 Ahau 8 Cumku " with the help of 364 days, then both dates (August 11, 3113 BC [August 11, 3113] BC [PJC]), of course, will change.

The Maya priests did not do in vain so that the "Long Count periods" was closely related to 260 and 364 days, the draconic year and month, and also to other types of lunar month (sidereal month, synodic month, anomalistic month). They found something important that we cannot find: [31] [45] [66]

1. 1820 days × 1,040 = 1,892,800 days = 5,200 × 364 days
2. 260 day × 7,280 = 1,892,800 days = 5,460 × 346.6666667 days
3. 27.55448153 days × 68,693 = 1,892,800 days = 69,557 month × 27.21221444 day
4. 29.53070394 days × 64,096 = 1,892,800 days = 69,278 month × 27.3218049 day
5. 28 day × 67,600 = 1,892,800 days = 270,400 × 7 days

For this reason, a new date (zero day), to be determined for the "Long Count periods", must correspond to both the solar eclipse and the covering of the Pleiades by the Moon that occurred on the "X" day. To find the desired date "X", load the GPS coordinates of Quirigua (15°16'8.25"N 89°2'24.97"W) [50] in SkyMap Online (15°16'N 89°2'W) [64] and hurry to look for the date "X". The Sun and the Pleiades were simultaneously shaded by the new Moon at about these dates:

1. Tuesday, June 14, 1954 BCE, UT 17:40 (JDN 1,007,888.5) The New Moon covered the Sun and Pleiades;
2. Thursday, June 16, 2828 BCE, UT 17:50 (JDN 688,662.5) The New Moon covered the Sun and Pleiades;
3. Saturday, June 19, 3702 BCE, UT 18:00 (JDN 369,436.5) The New Moon covered the Sun and Pleiades;
4. Monday, June 21, 4139 BCE, UT 18:00 (JDN 209,824.5) The New Moon covered the Sun and Pleiades;
5. Friday, June 21 and Saturday, June 22, 4595 BCE., UT 18:20 (JDN 43,270.5 and 43,271.5) The New Moon covered the Sun and the Pleiades.

What is remarkable, on this day the Sun covered the planet Uranus and Mars. Thus, in those days, the planets – Venus, Uranus, Mars, Mercury, Saturn and Jupiter were built in one row, and a beautiful and impressive sky-picture was created, the so-called "Parade of the Planet". If I was a Mayan priest, I would choose for the "zero day" in the "Long Count periods" exactly on June 21, 4595 BCE or June 22, 4595 BCE. All these amazing phenomena of the sky were even visible on the coordinate of Almaty (43°13'N 76°55'E, Saturday, June 22, 4595 BCE., UT 07:20).

If someone else doubts the astronomical abilities of the Mayan priests, and also my statement about this, please look at these calculations. After these equalities, I think, there should be no doubt about the correctness of my statement written in this article. According to the coordinates of Quirigua (15°16'N 89°2'W) in SkyMap Online, one can see that the eclipse of the Sun by a new Moon occurred on March 20, 2015 (Friday, 20.03.2015 AD, UT 21-00, JDN 2,457,101.5). Now draw a parallel between this and the previous eclipse of the Sun (Friday, 21.06.4595 BCE., UT 21-00, JDN 43,270.5).

1. 2,457,101 days – 43,270 days = 2,413,831 days = 6609 × 365,234 days;
2. 2,457,101 days – 43,270 days = 2,413,831 days = 6964 × 346,6156 days;

3. 27.2122 days × 88,704 = 2,413,831 days = 87,602 × 27.55,452 days;
4. 27.321543 days × 88349 = 2,413,831 days = 81740 × 29.530597015 days;
5. 1,040 days × 2,321 = 2,413,840 days = 9,284 year × 260 days;
6. 2,413,831 + 9 = 2,413,840 days = 6,963 × 346.666,667 days;
7. 260 days × 7,280 = 1,892,800 days = 1,040 days × 1,820 (13 baktuns);
8. 364 days × 5,200 = 1,892,800 days = 1,820 days × 1,040 (13 baktuns);
9. 2,413,831 – 1,892,800 = 521,031 & 521,031 + 9 = 521,040 = 260 days × 2,004.
As can be seen from these equations, for 6609 years the error of Maya priests was only +9 days!

After all that has been said, it remains to add: when Michael D. Coe wrote in his book "In violation of the Maya code" [67] "Despite the fact that the oceans of ink that have been shed on this issue, now there is not the slightest chance, that these three scientists (in conjunction with GMT, when they talk about correlation) were not right ... ", in fact, Michael D. Coe was not right...

In this short article, we were unable to acquaint the reader with how and on what principles "Urker esebi" and "Togys esebi" are working. However, they are described in detail in the author's manuscript book, which may be published in 2019. [30] This book provides a detailed description of various calendar systems of the world (the Mayan calendar is only one of them), as well as the Turkic-Kazakh variant of "Long Count periods", consisting of 212,027,463,648,000 days. (**Table 11** and **Table 12**) [30, pp. 671-682, 771-772]

By the way, in determining this huge amount of digital data, a curious case occurred. More precisely, the program "Microsoft Office Excel 2010" or in general "the decimal numeral system" of modern mathematics has failed. I will write briefly about this.

At the very beginning, we were looking for a common divisor for the "Turkic-Kazakh 12-year animal cycle" **(1-12, 2-24, 3-36, 4-48, 5-60, 6-72, 7-84, 8-96, 9-108, 10-120, 11-132, 12-144, 13-156, 14-168, 15-180, 16-192, 17-204, 18-216, 19- 228, 20-240, 21 -252, 22-264, 23-276, 24-288, 25-300, 26-312, 27-324, 28-336, 29-348, 30-360)**.

In the 90s of the last century, I started searching with a simple calculator, and in 2010 – using Microsoft Office Excel 2007. These searches ended only in 2017. (Table 12) As a result, we found that the modern "Microsoft Office Excel 2010", used by all of us and working on the basis of "decimal number system" (using the digits 1, 2, 3, 4, 5, 6, 7, 8, 9, 0) [68] shows one thing, but it turns out another. For example, starting at 268,713,244,800, the whole calculation (from 12 to 360) is divided into a divisor without a remainder (OK), but in fact the numbers 204, 228 and 276 are divided into a divisor with a remainder of 48, 36 and 12, respectively.

The Latin proverb says: "Qui quaerit, repent" (Who seeks will always find). And we found the only number of figures that is divided into all the years of the "Turkic-Kazakh 12-year animal cycle" without a remainder, except for the 29th line of Table 12. This was a huge number of figures of 10,601,373,182,400 seconds / minute / hour / days / years. The above number of 212,027,463,648,000 is his "close relative":
10,601,373,182,400 × 20 = 212,027,463,648,000.

Thus, multiplying these numbers can continue indefinitely. Thanks to the "duodecimal number system" (using the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B) [69] of nomadic Kazakhs, the horizons of the use of modern mathematics can expand to the sky.

On Tables 11 and 12 we see that 212,027,463,648,000 days without a remainder is divided into all possible indicators of mathematical and astronomical science, and so on. I hope in the near future readers will be able to read this interesting book. But I immediately warn that this work is not

similar to modern strict scientific work. Rather, it is similar to ancient treatises. Curious minds in this book will find a lot of interesting, and the assumption of which was not even suspected.

As we all know, for centuries, Maya researchers are trying to represent the Mayan year in the form:
260 days (Tzolk'in) × 73 = 18,980 days = 52 × 365 days (''Haab').
The ratio of 260 days and 365 days among themselves can be represented in shorter "amal":
7,3 days × 50 «amal» = 365 days («Haab') and 5.2 days × 50 «amal» = 260 day (Tzolk'in).
(7,3 day или 7 day 7 hours 12 minutes and 5,2 day или 5 day 4 hours 48 minutes)
From here it is easy to determine where the figures of 73 and 52 come from! (**Table 13**).

Using the so-called "amal" we completely deciphered and the calendar of the ancient Romans, right up to the Gregorian calendar. They turned out to be an "unclean" solar calendar, as they are now called. They are based on synodic and sidereal months, i. this can be expressed in two paintings, which were painted on one canvas. One of them can be seen visually, and the second one can be seen only with the help of infrared and X-rays. [70] [71] However, this is a completely different topic that could be written in the future ...

Name: **Kaldarkhan** Patronymic: **Aliseituly** Surname: **Kambar**

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Kazakhstan, Almaty, A05F7B5, Muratbaev St., Building 125, Apt. 36,
E-mail: kkaldarhan@gmail.com, k_kambar.30.12.1963@mail.ru, kaldarhan79@yandex.kz
Mobile phone: +7 705 209 3584, +7 778 323 6315.

TITLE
NAME OF WORK: Kazakh National Calendar
CONTENT NAME:
The first part of the research since 1985 to 1995
Archeoastronomical image of Kazakhstan
The second part of the research since 1995 to 2000
Short description three kinds of calendar
The third part of the research since 2000 to 2010
About the calendars of ancient nomads and Kazakhs
The fourth part of the research since 2010 to 2017
Space and time in the galaxy

Table 1. The sun and its eight planets, which the Mayan priests could identify

⊙	**Solar system (the Sun and its 8 planets)**	**Modern IAU**	**version of Kambar in Maya (Tzolk'in - Tonalpohualli)**				**Maya in days**
	1	**2**	**3**				**4**
No	Sun sidereal rotation period	Days	Tzo	×	=	÷	=
1	(at equator)	25.05	260	29	7,540	301	25.04983388
2	(at 16° latitude)	25.38	260	45	11,700	461	25.37960954
3	(at poles)	34.4	260	28	7,280	211	34.50236967
4	Period of other rotation Sun	24.47	260	8	2,080	85	24.47058823
5	Period of other rotation Sun	26.24	260	11	2,860	109	26.23853211
6	Period of other rotation Sun	27.2753	260	15	3,900	143	27.27272727
7	Mercury sidereal rotat. period	58.646	260	30	7,800	133	58.64661654
8	Mercury orbital period	87.969	260	45	11,700	133	87.96992481
9	Mercury synodic period	115.88	260	119	30,940	267	115.8801498
10	Venus sidereal rotat. period	243.69	260	254	66,040	271	243.6900369
11	Venus orbital period	224.701	260	261	67,860	302	224.7019868
12	Venus synodic period	583.92	260	676	175,760	301	583.9202658
13	Moon's draconic month	27.21222082	260	9	2,340	86	27.20930233
14	Moon's sidereal month	27.3216615	260	31	8,060	295	27.3220339
15	Moon's anomalistic month	27.55454988	260	39	10,140	368	27.55434783
16	Moon's synodic month	29.5305889	260	46	11,960	405	29.5308642
17	Mars orbital period	686.98	260	901	234,260	341	686.9794721
18	Mars synodic period	779.94	260	3	780	1	780
19	Jupiter orbital period	4,332.589	260	1,933	502,580	116	4,332.586207
20	Jupiter synodic period	398.88	260	247	64,220	161	398.8819876
21	Saturn orbital period	10,759.22	260	3,145	817,700	76	10,759.21053
22	Saturn synodic period	378.09	260	381	99,060	262	378.0916031
23	Uranus orbital period	30,685.4	260	5,665	1,472,900	48	30,685.41667
24	Uranus synodic period	369.66	260	209	54,340	147	369.6598639
25	Neptune orbital period	59,799.9	260	230	59,800	1	59,800
26	Neptune synodic period	367.49	260	400	104,000	283	367.4911661

Table 2. The sun and its eight planets, which Kazakh "esepshi" could identify

☼	**Solar system (the Sun and its 8 planets)**	**Modern IAU**	**version of Kambar in Kazakh (Urker esebi – Togys esebi)**				**Kazakh in days**
	1	**2**	**3**				**4**
No	Sun sidereal rotation period	Days	Tzo	×	=	÷	=
1	(at equator)	25.05	273	10	2,730	109	25.04587156
2	(at 16° latitude)	25.38	273	37	10,101	398	25.37939698
3	(at poles)	34.4	273	23	6,279	182	34.5
4	Period of other rotation Sun	24.47	273	32	8,736	357	24.47058824
5	Period of other rotation Sun	26.24	273	47	12,831	489	26.2392638
6	Period of other rotation Sun	27.2753	273	1	273	10	27.3
7	Mercury sidereal rot. period	58.646	273	29	7,917	135	58.64444444
8	Mercury orbital period	87.969	273	29	7,917	90	87.96666667
9	Mercury synodic period	115.88	273	59	16,107	139	115.8776978
10	Venus sidereal rotat. period	243.69	273	291	79,443	326	243.690184
11	Venus orbital period	583.92	273	77	21,021	36	583.9166667
12	Venus synodic period	224.701	273	107	29.211	130	224.7
13	Moon's draconic month	27.21222082	273	31	8,463	311	27.21221865
14	Moon's sidereal month	27.3216615	273	126	34,398	1,259	27.32168388
15	Moon's anomalistic month	27.55454988	273	11	3,003	109	27.55045872
16	Moon's synodic month	29.5305889	273	94	25,662	869	29.53049482
17	Mars orbital period	779.94	273	20	5,460	7	780
18	Mars synodic period	686.98	273	1,150	313,950	457	686.9803063
19	Jupiter orbital period	4,332.589	273	2,936	801,529	185	4,332.589189
20	Jupiter synodic period	398.88	273	507	138,411	347	398.8789625
21	Saturn orbital period	10,759.22	273	3,547	968,330	90	10,759.22222
22	Saturn synodic period	378.09	273	644	175,812	465	378.0903226
23	Uranus orbital period	30,685.4	273	23,267	6,351,891	207	30,685.46377
24	Uranus synodic period	369.66	273	283	77,259	209	369.6602871
25	Neptune orbital period	59,799.9	273	13,800	3,767,400	63	59,800
26	Neptune synodic period	367.49	273	35	9,555	26	367.5

Table 3. Tzolk'in calendar: named days and associated glyphs (in sequence)

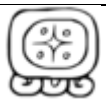
Seq. No 1	Day Name 2	Казахский смысл	Glyph example 3	Seq. No 1	Day Name 2	Казахский смысл	Glyph example 3
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
01	Imix' – 18.2 day	«Imek» – bent		11	Chuwen – 200.2 day	«Chu...» – noise	
02	Ik' – 36.4 day	«Eki» – two, the second		12	Eb' – 218.4 day	?	
03	Ak'b'al – 54.6 day	«Ak bal» – white honey		13	B'en – 236.6 day	?	
04	K'an – 72.8 day	«Kan» – blood		14	Ix – 254.8 day	?	
05	Chikchan – 91 day	«Tyshkan» – mouse		15	Men – 273 day	«Men» – I	
06	Kimi – 109.2 day	«Kim» – who or clothes		16	K'ib' – 291.2 day	«Kybi» – tub	
07	Manik' – 127.4 day	«Man..» – value		17	Kab'an – 309.4 day	«Kaban» – boar or wild boar	
08	Lamat – 145.6 day	«...at» – horse		18	Etz'nab' – 327.6 day	«Aznap» – blow	
09	Muluk – 163.8 day	«Muluk» – thing		19	Kawak – 345.8 day	«Kawak» – head or emptiness	
10	Ok – 182 day	«Ok» – arrow or white color		20	Ajaw – 364 day	«Ojau» – scoop	

Table 4. Table of Long Count periods (Modern science)

Table of Long Count units (Modern science)			
1	**2**	**3**	**4**
Long Count unit	**Long Count period**	**Days**	**Approximate Solar Years**
1 K'in		1	
1 Winal	20 K'in	20	
1 Tun	18 Winal	360	1
1 K'atun	20 Tun	7,200	20
1 B'ak'tun	20 K'atun	144,000	394
1 Piktun	20 B'ak'tun	2,880,000	7,885
1 Kalabtun	20 Piktun	57,600,000	157,704
1 K'inchiltun	20 Kalabtun	1,152,000,000	3,154,071
1 Alautun	20 K'inchiltun	23,040,000,000	63,081,429

Table 5. Table of Long Count periods (1-st version of Kambar)

Table of Long Count units (author's [Kambar] version)			
Long Count unit	**Long Count period**	**Days**	**Approximate Solar Years**
1	**2**	**3**	**4**
1 K'in		1	
1 Winal	18.2 K'in	18.2	18.2 = 18 d. 4 h. 48 m.
1 Tun	20 Winal	364	1
1 K'atun	20 Tun	7,280	20
1 B'ak'tun	20 K'atun	145,600	400
1 Piktun	20 B'ak'tun	2,912,000	8,000
1 Kalabtun	20 Piktun	58,240,000	160,000
1 K'inchiltun	20 Kalabtun	1,164,800,000	3,200,000
1 Alautun	20 K'inchiltun	23,296,000,000	64,000,000

Table 6. Table of Long Count periods (2-nd version Kambar)

Table of Long Count units (author's [Kambar] version)			
Long Count unit	**Long Count period**	**Days**	**Approximate Solar Years**
1	**2**	**3**	**4**
1 K'in		1	
1 Winal	9.1 K'in	9.1	9.1 = 9 d. 2 h. 24 m.
1 Tun	40 Winal	364	1
1 K'atun	40 Tun	7,280	20
1 B'ak'tun	40 K'atun	145,600	400

1 Piktun	40 B'ak'tun	2,912,000	8,000
1 Kalabtun	40 Piktun	58,240,000	160,000
1 K'inchiltun	40 Kalabtun	1,164,800,000	3,200,000
1 Alautun	40 K'inchiltun	23,296,000,000	64,000,000

Table 7. 18.2 and 9.1 days corresponding to 20-21 and 40-42 "amal"

18.2 day "amal" of the Mayan priests						**9.1 days "amal" of the Kazakh "esepshi"**				
1	**2**	**3**		**4**		**5**	**6**	**7**		**8**
No	**Amal**	**Number of months**		**Sidereal month**		**No**	**Amal**	**Number of months**		**Sidereal month**
1	18.2	0.666666667	1	18.2		1	9.1	0.333333333	0	9.1
2	36.4	1.333333333	1	36.4		2	18.2	0.666666667	1	18.2
3	54.6	2	2	27.3		3	27.3	1	1	27.3
4	72.8	2.666666667	3	24.26666667		4	36.4	1.333333333	1	36.4
5	91	3.333333333	3	30.33333333		5	45.5	1.666666667	2	22.75
6	109.2	4	4	27.3		6	54.6	2	2	27.3
7	127.4	4.666666667	5	25.48		7	63.7	2.333333333	2	31.85
8	145.6	5.333333333	5	29.12		8	72.8	2.666666667	3	24.26666667
9	163.8	6	6	27.3		9	81.9	3	3	27.3
10	182	6.666666667	7	26		10	91	3.333333333	3	30.33333333
11	200.2	7.333333333	7	28.6		11	100.1	3.666666667	4	25.025
12	218.4	8	8	27.3		12	109.2	4	4	27.3
13	236.6	8.666666667	9	26.28888889		13	118.3	4.333333333	4	29.575
14	254.8	9.333333333	9	28.31111111		14	127.4	4.666666667	5	25.48
15	273	10	10	27.3		15	136.5	5	5	27.3
16	291.2	10.66666667	11	26.47272727		16	145.6	5.333333333	5	29.12
17	309.4	11.33333333	11	28.12727273		17	154.7	5.666666667	6	25.78333333
18	327.6	12	12	27.3		18	163.8	6	6	27.3
19	345.8	12.66666667	13	26.6		19	172.9	6.333333333	6	28.81666667
20	**364**	**13.33333333**	**13**	**28**		20	182	6.666666667	7	26
21	**382.2**	**14**	**14**	**27.3**		21	191.1	7	7	27.3
22	400.4	14.66666667	15	26.69333333		22	200.2	7.333333333	7	28.6
23	418.6	15.33333333	15	27.90666667		23	209.3	7.666666667	8	26.1625
24	436.8	16	16	27.3		24	218.4	8	8	27.3
25	455	16.66666667	17	26.76470588		25	227.5	8.333333333	8	28.4375
26	473.2	17.33333333	17	27.83529412		26	236.6	8.666666667	9	26.28888889
27	491.4	18	18	27.3		27	245.7	9	9	27.3
28	509.6	18.66666667	19	26.82105263		28	254.8	9.333333333	9	28.31111111
29	527.8	19.33333333	19	27.77894737		29	263.9	9.666666667	10	26.39
30	546	20	20	27.3		30	273	10	10	27.3
31	564.2	20.66666667	21	26.86666667		31	282.1	10.33333333	10	28.21
32	582.4	21.33333333	21	27.73333333		32	291.2	10.66666667	11	26.47272727
33	600.6	22	22	27.3		33	300.3	11	11	27.3
34	618.8	22.66666667	23	26.90434783		34	309.4	11.33333333	11	28.12727273
35	637	23.33333333	23	27.69565217		35	318.5	11.66666667	12	26.54166667
36	655.2	24	24	27.3		36	327.6	12	12	27.3
37	673.4	24.66666667	25	26.936		37	336.7	12.33333333	12	28.05833333
38	691.6	25.33333333	25	27.664		38	345.8	12.66666667	13	26.6
39	709.8	26	26	27.3		39	354.9	13	13	27.3
40	728	26.66666667	27	26.96296296		**40**	**364**	**13.33333333**	**13**	**28**

41	746.2	27.33333333	27	27.63703704		41	373.1	13.66666667	14	26.65
42	764.4	28	28	27.3		**42**	**382.2**	**14**	**14**	**27.3**
43	782.6	28.66666667	29	26,9862069		43	391.3	14.33333333	14	27.95
44	800.8	29.33333333	29	27.6137931		44	400.4	14.66666667	15	26.69333333
45	**819**	**30**	**30**	**27.3**		45	409.5	15	15	27.3

Table 8. Dates coinciding and not coinciding with the occultation the Pleiades by the Moon

No	**GPS coordinate**	**UT –05:00**	**Long Count periods (date)**	**Julian Day [57]**
	1	**2**	**3**	**4**
1	20°40'N 88°34'W	UT 12:35	Monday, September 6, –3114 BCE	JD 584,282,5
2	----------	UT --:--	Monday, August 11, –3113 BCE **[PGC]**	JD 584,282,5
3	20°40'N 88°34'W	UT 14:00	Friday, August 11, –3113 BCE	JD 584,622,5
4	----------	UT --:--	Friday, July 16, –3112 BCE **[PGC]**	JD 584,622,5
5	20°40'N 88°34'W	UT 3:35	Tuesday, December 25, 2012 CE	JD 2456286.5
6	20°40'N 88°34'W	UT 3:35	Wednesday, December 26, 2012 CE	JD 2456287.5

Table 9. JDN correlations to the Maya creation date (Modern science)

Long Count	**Gregorian date GMT (584283) correlation**	**Julian day number**	**1 B'ak'tun**
1	**2**	**3**	**4**
13.0.0.0.0	**Mon, Aug 11, 3114 BCE (PGC)**	**584,283**	**0**
1.0.0.0.0	Thu, Nov 13, 2720 BCE	728,283	144,000
2.0.0.0.0	Sun, Feb 16, 2325 BCE	872,283	144,000
3.0.0.0.0	Wed, May 21, 1931 BCE	1,016,283	144,000
4.0.0.0.0	Sat, Aug 23, 1537 BCE	1,160,283	144,000
5.0.0.0.0	Tue, Nov 26, 1143 BCE	1,304,283	144,000
6.0.0.0.0	Fri, Feb 28, 748 BCE	1,448,283	144,000
7.0.0.0.0	Mon, Jun 3, 354 BCE	1,592,283	144,000
8.0.0.0.0	Thu, Sep 5, 41 CE	1,736,283	144,000
9.0.0.0.0	Sun, Dec 9, 435 CE	1,880,283	144,000
10.0.0.0.0	Wed, Mar 13, 830 CE	2,024,283	144,000
11.0.0.0.0	Sat, Jun 15, 1224 CE	2,168,283	144,000
12.0.0.0.0	Tue, Sep 18, 1618 CE	2,312,283	144,000
13.0.0.0.0	**Fri, Dec 21, 2012 CE**	**2,456,283**	**144,000**
1.0.0.0.0	Mon, Mar 26, 2407 CE	2,600,283	144,000
2.0.0.0.0	Thu, Jun 28, 2801 CE	2,744,283	144,000

Table 10. JDN correlations to the Maya creation date (Kambar version)

Long Count	**Julian date Kambar (584622) correlation**	**Julian day Number**	**1 B'ak'tun**
1	**2**	**3**	**4**
13.0.0.0.0	**Fri, Aug 11, 3113 BCE (PJC)**	**584,622**	**0**
1.0.0.0.0	Fri, Mar 30, 2714 BCE	730,222	145,600
2.0.0.0.0	Fri, Nov 15, 2316 BCE	875,822	145,600
3.0.0.0.0	Fri, Jul 17, 1917 BCE	1,021,422	145,600
4.0.0.0.0	Fri, Feb 19, 1518 BCE	1,167,022	145,600
5.0.0.0.0	Fri, Oct 7, 1120 BCE	1,312,622	145,600
6.0.0.0.0	Fri, May 25, 721 BCE	1,458,222	145,600

7.0.0.0.0	Fri, Jan 11, 322 BCE	1,603,822	145,600
8.0.0.0.0	Fri, Aug 29. 77 CE	1,749,422	145,600
9.0.0.0.0	Fri, Apr 16, 476 CE	1,895,022	145,600
10.0.0.0.0	Fri, Dec 3, 874 CE	2,040,622	145,600
11.0.0.0.0	Fri, Jul 21, 1273 CE	2,186,222	145,600
12.0.0.0.0	Fri, Mar 18, 1672 CE	2,331,822	145,600
13.0.0.0.0	**Fri, Nov 7, 2070 CE**	**2,477,422**	**145,600**
14.0.0.0.0	Fri, Jun 28, 2469 CE	2,623,022	145,600
15.0.0.0.0	Fri, Feb 17, 2868 CE	2,768,622	145,600

Table 11. The Kazakh version of the " Long Count periods" consisting of 212,027,463,648,000 days

No	**(IAU / Kambar version)**	**Universal number – 212,027,463,648,000 Numerator**	**Denominator**	**(Kambar vers.) Quotient**
1	24 hours	hours (1 days)	8,834,477,652,000	24
2	1,440 min.	minutes (24 × 60)	147,241,294,200	1,440
3	86,400 sec.	seconds (1440 × 60)	2,454,021,570	86,400
4	31,104,000 sec.	360 day = ephemeris second	6,816,726	31,104,002.666
5	31,449,600 sec.	364 day = ephemeris second	6,741,817	31,449,602.333
6	31,536,000 sec.	365 day = ephemeris second	6,723,346	31,536,003.598
7	31,557,600 sec.	365.25 = ephemeris second	6,718,744	31,557,604.166
8	346.620075883	draconic year	611,699,893,920	346.6200759 day
9	27.212220817	draconic month	7,791,626,603,131	27.21222082 day
10	353.758870621	draconic year: 27,212220817 × 13 month	599,355,892,549	353.7588706 day
11	27.321582241	tropical month	7,760,438,680,957	27.32158224 day
12	355.180569133	tropical year: 27.321582241 × 13 month	596,956,821,612	355.1805691 day
13	27.321661547	sidereal month	7,760,416,154,898	27.32166155 day
14	355.181600111	sidereal year: 27.321661547 × 13 month	596,955,088,838	355.1816001 day
15	27.554549878	anomalistic month	7,694,825,884,900	27.55454988 day
16	358.209148414	anomalistic year: 27.554549878 × 13 mon.	591,909,683,454	358.2091484 day
17	29.530588853	synodic month	7,179,926,709,334	29.53058885 day
18	354.367066236	synodic year: 29.530588853 × 12 month	598,327,225,778	354.3670662 day
19	365.24218967	tropical year	580,511,971,588	365.2421897 day
20	365 day	365 day "haab'" – Remainder 165 day!	580,897,160,679	365.0000000003
21	365.25 day	julian year – Remainder 109 day!	580,499,558,242	365.2500000002
22	366 day	leap year – Remainder 78 day!	579,310,009,967	366.0000000001
23	365.2551897 d.	ecliptic middle day	580,491,310,259	365.2551897
24	365.256363 day	sidereal year	580,489,445,563	365.256363
25	365.2568983 d.	gaussian year	580,488,594,835	365.2568983
26	365.259636 day	anomalistic year	580,484,243,948	365.259636
27	3,232.6054 day	with respect to the perigee (precesses)	65,590,270,822	3,232.6054
28	8.850578 year	with respect to the perigee (precesses)	23,956,340,890,731	8.850578
29	6,793.4765 day	with res. to the ascending node (precesses)	31,210,450,739	6,793.4765
30	18.5996 year	with res. to the ascending node (precesses)	11,399,571,154,649	18.5996
31	6,585.3213 day	"saros" periods	32,196,980,829	6,585.3213
32	6,939.68838 day	cycle of "metons"	30,552,879,616	6,939.68838
33	7 day	week	30,289,637,664,000	7 days
34	27.3 day	classic sidereal month	7,766,573,760,000	27.3
35	28 day	ancient classical sidereal month	7,572,409,416,000	28
36	260 day	260-day "tzolk'in"	815,490,244,800	260
37	273 day	273-day "urker esebi" and "togys esebi"	776,657,376,000	273
38	360 day	ancient classical year	588,965,176,800	360
39	364 day	364-day "urker esebi" and "togys esebi"	582,493,032,000	364
40	765 day	765-day "jety amal" esebi	277,160,083,200	765
41	819 day	"819-day count" of the maya	258,885,792,000	819
42	1,040 day	maya eclipse periods	203,872,561,200	1,040
43	1,092 day	cycle of the togys esebi	194,164,344,000	1,092
44	1,820 day	cycle of the maya calendar	116,498,606,400	1,820
45	5,460 day	cycle of the maya-togys calendar	38,832,868,800	5,460

46	7,280 day	1 k'atun=20 tun of the maya calendar	29,124,651,600	7,280
47	21,840 day	cycle of the maya-togys calendar	9,708,217,200	21,840
48	145,600 day	1 b'ak'tun=20 k'atun (kambar version)	1,456,232,580	145,600
49	23,900.501 year	precession period (kambar version)	8,871,256,031	23,900.501
50	8,729,476 day	precession period days (kambar version)	24,288,682	8,729,475.879 etc.

The Kazakh version of the "Long Count periods", consisting of 212,027,463,648,000 seconds / minutes / hour / days, is divided into many values of the IAU and the author, including 364 days without a remainder. However, 365 days (165 days of the remainder), 365.25 days (109 days of the remainder) and 366 days (78 days days of the remainder) are divided by this amount with the balances. Why this occurs is still unknown ...

Table 12. The figure 212,027,463,648,000 is divided into all known systems of positional numbers

№1	№2	№3	№4	№5	№6	№7	№8	№9	№10	№11	№12	№13	№14	№15	№16	№17	№18	№19	№20	№21	№22	№23	№24
1	2	3	4	5	6	8	9	**10**	11	**12**	15	**16**	**20**	22	24	25	30	40	50	**60**	80	110	120
2	4	6	8	10	12	16	18	**20**	22	**24**	30	**32**	**40**	44	48	50	60	80	100	**120**	160	220	240
3	6	9	12	15	18	24	27	**30**	33	**36**	45	**48**	**60**	66	72	75	90	120	150	**180**	240	330	360
4	8	12	16	20	24	32	36	**40**	44	**48**	60	**64**	**80**	88	96	100	120	160	200	**240**	320	440	480
5	10	15	20	25	30	40	45	**50**	55	**60**	75	**80**	**100**	110	120	125	150	200	250	**300**	400	550	600
6	12	18	24	30	36	48	54	**60**	66	**72**	90	**96**	**120**	132	144	150	180	240	300	**360**	480	660	720
7	14	21	28	35	42	56	63	**70**	77	**84**	105	**112**	**140**	154	168	175	210	280	350	**420**	560	770	840
8	16	24	32	40	48	64	72	**80**	88	**96**	120	**128**	**160**	176	192	200	240	320	400	**480**	640	880	960
9	18	27	36	45	54	72	81	**90**	99	**108**	135	**144**	**180**	198	216	225	270	360	450	**540**	720	990	1080
10	20	30	40	50	60	80	90	**100**	110	**120**	150	**160**	**200**	220	240	250	300	400	500	**600**	800	1100	1200
11	22	33	44	55	66	88	99	**110**	121	**132**	165	**176**	**220**	242	264	275	330	440	550	**660**	880	1210	1320
12	24	36	48	60	72	96	108	**120**	132	**144**	180	**192**	**240**	264	288	300	360	480	600	**720**	960	1320	1440
13	26	39	52	65	78	104	117	**130**	143	**156**	195	**208**	**260**	286	312	325	390	520	650	**780**	1040	1430	1560
14	28	42	56	70	84	112	126	**140**	154	**168**	210	**224**	**280**	308	336	350	420	560	700	**840**	1120	1540	1680
15	30	45	60	75	90	120	135	**150**	165	**180**	225	**240**	**300**	330	360	375	450	600	750	**900**	1200	1650	1800
16	32	48	64	80	96	128	144	**160**	176	**192**	240	**256**	**320**	352	384	400	480	640	800	**960**	1280	1760	1920
17	34	51	68	85	102	136	153	**170**	187	**204**	255	**272**	**340**	374	408	425	510	680	850	**1020**	1360	1870	2040
18	36	54	72	90	108	144	162	**180**	198	**216**	270	**288**	**360**	396	432	450	540	720	900	**1080**	1440	1980	2160
19	38	57	76	95	114	152	171	**190**	209	**228**	285	**304**	**380**	418	456	475	570	760	950	**1140**	1520	2090	2280
20	40	60	80	100	120	160	180	**200**	220	**240**	300	**320**	**400**	440	480	500	600	800	1000	**1200**	1600	2200	2400
21	42	63	84	105	126	168	189	**210**	231	**252**	315	**336**	**420**	462	504	525	630	840	1050	**1260**	1680	2310	2520
22	44	66	88	110	132	176	198	**220**	242	**264**	330	**352**	**440**	484	528	550	660	880	1100	**1320**	1760	2420	2640
23	46	69	92	115	138	184	207	**230**	253	**276**	345	**368**	**460**	506	552	575	690	920	1150	**1380**	1840	2530	2760
24	48	72	96	120	144	192	216	**240**	264	**288**	360	**384**	**480**	528	576	600	720	960	1200	**1440**	1920	2640	2880
25	50	75	100	125	150	200	225	**250**	275	**300**	375	**400**	**500**	550	600	625	750	1000	1250	**1500**	2000	2750	3000
26	52	78	104	130	156	208	234	**260**	286	**312**	390	**416**	**520**	572	624	650	780	1040	1300	**1560**	2080	2860	3120
27	54	81	108	135	162	216	243	**270**	297	**324**	405	**432**	**540**	594	648	675	810	1080	1350	**1620**	2160	2970	3240
28	56	84	112	140	168	224	252	**280**	308	**336**	420	**448**	**560**	616	672	700	840	1120	1400	**1680**	2240	3080	3360
29	**58**	**87**	**116**	**145**	**174**	**232**	**261**	**290**	**319**	**348**	**435**	**464**	**580**	**638**	**696**	**725**	**870**	**1160**	**1450**	**1740**	**2320**	**3190**	**3480**
30	60	90	120	150	180	240	270	**300**	330	**360**	450	**480**	**600**	660	720	750	900	1200	1500	**1800**	2400	3300	3600

All these figures up to the 28th line are divided into 212,027,463,648,000 without a remainder, and on the 29th line everything is divided into a divisor with a remainder, and on the 30th line everything is divided again into a divisor without a remainder, etc. Why this happens, we will soon find out...

Table 13. The relationship between 365 day ("Haab") and 260 day (Tzolk'in) through short "amal"

1	**2**	**3**	**4**	**5**		**6**	**7**	**8**	**9**	**10**
No	**Amal**	**Number of months**		**Sinodic month**		**No**	**Amal**	**Number of months**		**Sinodic month**
1	7,3	0,247206231	0	0		1	5,2	0,176088597	0	0
2	14,6	0,494412462	0	0		2	10,4	0,352177195	0	0
3	21,9	0,741618693	1	21,9		3	15,6	0,528265792	1	15,6
4	**29,2**	**0,988824924**	**1**	**29,2**		4	20,8	0,70435439	1	20,8
5	36,5	1,236031155	1	36,5		5	26	0,880442987	1	26
6	43,8	1,483237386	1	43,8		**6**	**31,2**	**1,056531585**	**1**	**31,2**
7	51,1	1,730443617	2	25,55		7	36,4	1,232620182	1	36,4
8	**58,4**	**1,977649848**	**2**	**29,2**		8	41,6	1,40870878	1	41,6
9	65,7	2,224856079	2	32,85		9	46,8	1,584797377	2	23,4
10	73	2,47206231	2	36,5		10	52	1,760885975	2	26
11	80,3	2,71926854	3	26,76666667		**11**	**57,2**	**1,936974572**	**2**	**28,6**
12	**87,6**	**2,966474771**	**3**	**29,2**		12	62,4	2,11306317	2	31,2
13	94,9	3,213681002	3	31,63333333		13	67,6	2,289151767	2	33,8
14	102,2	3,460887233	3	34,06666667		14	72,8	2,465240365	2	36,4
15	109,5	3,708093464	4	27,375		15	78	2,641328962	3	26
16	**116,8**	**3,955299695**	**4**	**29,2**		16	83,2	2,81741756	3	27,73333333
17	124,1	4,202505926	4	31,025		**17**	**88,4**	**2,993506157**	**3**	**29,46666667**
18	131,4	4,449712157	4	32,85		18	93,6	3,169594755	3	31,2
19	138,7	4,696918388	5	27,74		19	98,8	3,345683352	3	32,93333333
20	**146**	**4,944124619**	**5**	**29,2**		20	104	3,52177195	4	26
21	153,3	5,19133085	5	30,66		21	109,2	3,697860547	4	27,3
22	160,6	5,438537081	5	32,12		22	114,4	3,873949145	4	28,6
23	167,9	5,685743312	6	27,98333333		**23**	**119,6**	**4,050037742**	**4**	**29,9**
24	**175,2**	**5,932949543**	**6**	**29,2**		24	124,8	4,22612634	4	31,2
25	182,5	6,180155774	6	30,41666667		25	130	4,402214937	4	32,5
26	189,8	6,427362005	6	31,63333333		26	135,2	4,578303535	5	27,04
27	197,1	6,674568236	7	28,15714286		27	140,4	4,754392132	5	28,08
28	**204,4**	**6,921774467**	**7**	**29,2**		**28**	**145,6**	**4,93048073**	**5**	**29,12**
29	211,7	7,168980698	7	30,24285714		29	150,8	5,106569327	5	30,16
30	219	7,416186929	7	31,28571429		30	156	5,282657925	5	31,2
31	226,3	7,663393159	8	28,2875		31	161,2	5,458746522	5	32,24
32	**233,6**	**7,91059939**	**8**	**29,2**		32	166,4	5,63483512	6	27,73333333
33	240,9	8,157805621	8	30,1125		33	171,6	5,810923717	6	28,6
34	248,2	8,405011852	8	31,025		**34**	**176,8**	**5,987012315**	**6**	**29,46666667**
35	255,5	8,652218083	9	28,38888889		35	182	6,163100912	6	30,33333333
36	**262,8**	**8,899424314**	**9**	**29,2**		36	187,2	6,33918951	6	31,2
37	270,1	9,146630545	9	30,01111111		37	192,4	6,515278107	7	27,48571429
38	277,4	9,393836776	9	30,82222222		38	197,6	6,691366705	7	28,22857143
39	284,7	9,641043007	10	28,47		39	202,8	6,867455302	7	28,97142857
40	**292**	**9,888249238**	**10**	**29,2**		**40**	**208**	**7,0435439**	**7**	**29,71428571**
41	299,3	10,13545547	10	29,93		41	213,2	7,219632497	7	30,45714286
42	306,6	10,3826617	10	30,66		42	218,4	7,395721094	7	31,2
43	313,9	10,62986793	11	28,53636364		43	223,6	7,571809692	8	27,95
44	**321,2**	**10,87707416**	**11**	**29,2**		44	228,8	7,747898289	8	28,6
45	328,5	11,12428039	11	29,86363636		**45**	**234**	**7,923986887**	**8**	**29,25**
46	335,8	11,37148662	11	30,52727273		46	239,2	8,100075484	8	29,9
47	343,1	11,61869285	12	28,59166667		47	244,4	8,276164082	8	30,55
48	**350,4**	**11,86589909**	**12**	**29,2**		48	249,6	8,452252679	8	31,2
49	357,7	12,11310532	12	29,80833333		49	254,8	8,628341277	9	28,31111111
50	**365**	**12,36031155**	**12**	**30,41666667**		**50**	**260**	**8,804429874**	**9**	**28,88888889**

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