

TALES OF THE MAYA SKIES

EL UNIVERSO MAYA • YOK' OL KAAB MAYAA'

EDUCATOR GUIDE



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EDUCATIONAL FRAMEWORK

Tales of the Maya Skies tells the story of how the ancient Maya interwove astronomy and culture to create a stable society that spanned 2,000 years, from 500 BCE to 1500 CE. Maya culture, life, architecture, and legends were intertwined with the ancient Maya's scientific observation and recording of planetary movements. The ancient Maya achieved an unparalleled understanding of astronomy. They developed an advanced system of mathematics that allowed them to create a set of calendars unrivaled in the ancient world.



Their logo-syllabic (symbols representing either a syllable or a word) writing system has fascinated linguists for centuries, and has only recently been decoded.

The show is set primarily at Chichén Itzá, one of the last great city states of the Maya classic/post classic period. This site is renowned for the alignment of its temples to the Sun and Venus, and for the glyphs representing deities associated with the Sun and Venus.

MAJOR CONCEPTS

1. As a result of ongoing celestial observation and recording, patterns were discerned and used to predict and guide the practical and cosmological life of the Maya.
 - ◆ Maya stories, traditions, and architecture illustrate what the Maya knew about astronomy and the role it played in daily life.
 - ◆ By observing the patterns of the Sun and Moon, the Maya created a precise and accurate calendar used to mark the seasons. The calendar was based on a sophisticated base-20 mathematical system incorporating the concept of zero.
 - ◆ By observing patterns of Venus, the Maya could predict rainy and dry seasons and plan agriculture activities and associated ceremonies.
2. Cycles of nature and astronomy were ritualized and recorded by the Maya in art and books, incorporated into the alignment of buildings, and monitored by a complex and accurate calendar system.
3. The scientific method of ongoing observation and recording of patterns that was used by the ancient Maya is integral to the scientific process used today.
4. Over seven million Maya currently live in Mexico, Belize, Guatemala, Honduras, El Salvador, the United States, and other countries around the world.

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SPECIFIC SCIENTIFIC AND MATHEMATICAL CONCEPTS

1. Seasonal change occurs as a result of the tilt of the Earth and the light absorbed as the Earth orbits the Sun.
2. A total solar eclipse occurs at predictable and precise times, and is a result of the passing of the Moon between the Sun and Earth.
3. The apparent erratic movements of Venus, observable with the naked eye, occur as a result of the Sun's glare blocking our view of Venus when the Earth, Venus and the Sun are perfectly aligned.
4. The movements of Venus repeat themselves in an eight-year cycle.
5. The Maya developed a sophisticated system of mathematics based on a place value of 20. They were one of few ancient cultures to use the concept of zero, allowing them to count into the millions.
6. Using their sophisticated mathematical system the ancient Maya developed precise and accurate calendars.



SPECIFIC CULTURAL CONCEPTS

1. The ancient Maya used astronomical knowledge to guide their lives.
2. Maya kings and day keepers affirmed their power and assuaged the fears of their people by demonstrating their ability to predict astronomical events.
3. The cosmological beliefs and daily life of the Maya were artfully recorded in books and paintings and carved into stone. While these stone carvings are decorative, their sole purpose was to record events during the reign of kings.
4. Nature and cosmology were interwoven into the artwork and life of the Maya.

NATIONAL AND CALIFORNIA STATE STANDARDS/Framework

The show content, and activities that follow, meets the following US Education Standards:

NS: K-4.1, NS.5-8.1, NS.9-12.1 Science as Inquiry
NS.K-4.4, NS.5-8.4, NS.9-12.4 Earth and Space Science
NS.K4.5, NS.5-8.5, NS.9-12.5 Science and Technology

Content meets the following California State standards:

Science: Grades 3 – 12; Earth Science, Investigation and Experimentation
World History & Geography: Grade six; Ancient Civilizations (standard 6.1)
Mathematics: Grades 3 – 12; Number Sense, Mathematical Reasoning

References for information and activities included:

Aveni, Anthony, *Skywatchers*

Aveni, Anthony, *Stairways to the Stars*

Braman, Arlette, *Activities and Crafts from a Mysterious Land*

Coe, Michael, *The Maya*

Focus Books, *The Mayan Calendar*

Freidel, David and Linda Schele, *Maya Cosmos*

Milbrath, Susan, *Star Gods of the Maya, Astronomy in Art, Folklore, and Calendars*

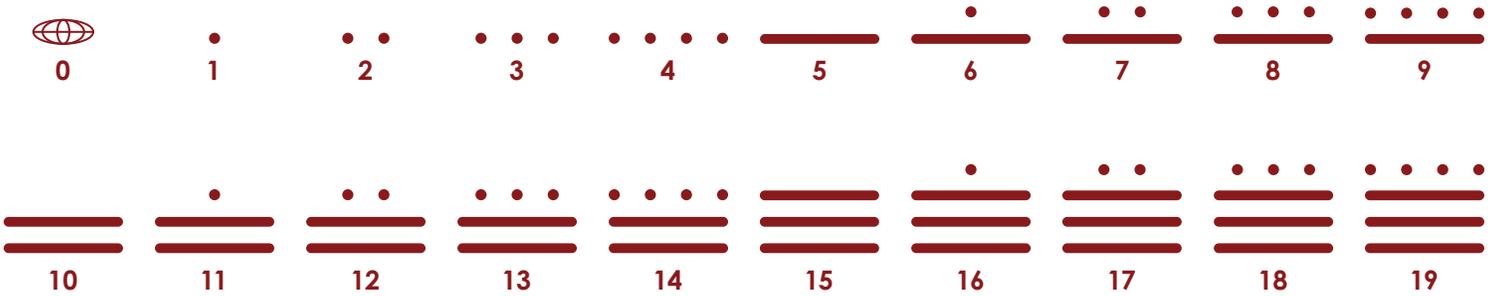


MAYA MATH

The ancient Maya had the most advanced system of mathematics of any ancient civilization in the Americas, and quite possibly in Europe and Asia. The Maya were one of the first ancient cultures to use the concept of zero which allowed them to write and calculate large sums.

Maya Numbers are written using three symbols, a shell image for zero, a dot representing one, and a bar for five. Different combinations of bars and dots represent numbers 6 – 19.

Maya numbers 1 – 19 are written like this:



Test your skill by writing your age using Maya numbers.

ANSWER
Ask a friend to check your answer.

Using the chart of Maya numbers 1-19 above, calculate the following sums. Write your answers using Maya numbers.

1)  +  =

3)  +  =

2)  +  =

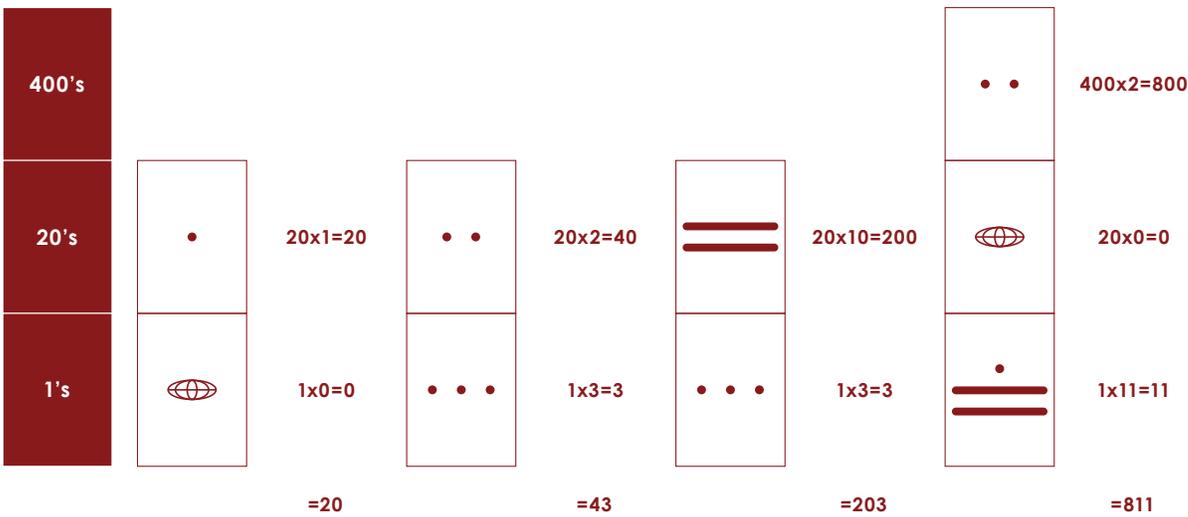
4)  +  =



Only numbers from 0 to 19 can be written using the symbols in the chart above.
 Numbers larger than 19 are represented using powers of 20.

Place value 20 numbers are recorded inside rows in vertical columns. Each ascending row has the value of a power of 20 (1, 20, 400, 800, etc). The number (1 – 19) within each row is multiplied by the place value of that row, and the results are summed for the entire column.

Below is a chart explaining how to write Maya numbers using the base 20 place-value system:



Calculate the sum of each of the following columns.
 (Remember that each row represents a power of 20, starting with the bottom row)

Write your answers in the boxes below each column.
 Record them in your own numbering system or, for more of a challenge, record your answers using Maya numbers.

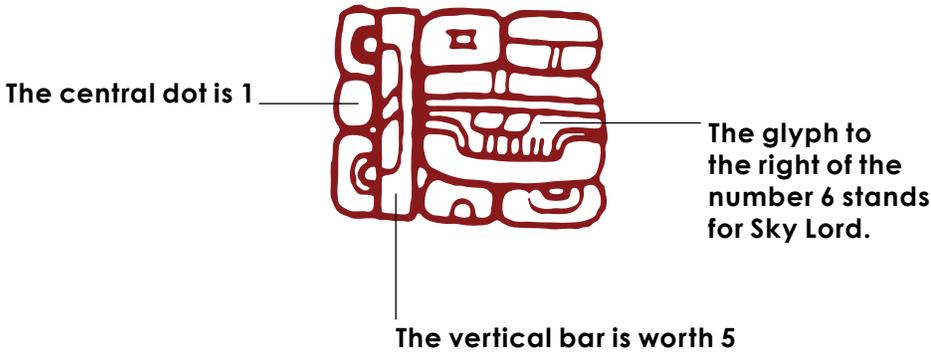
• • =====	• =====	• • •	=====	• =====
• •	• • •	• • =====	• • • • =====	• • • • =====
•	=====	⊕	• • • • =====	=====
Answers				



MAYA NUMBER GLYPHS

Number glyphs were widely used in the inscriptions on Maya stone carvings and in their books. Many Maya gods and rulers have numbers as part of their names.

The god Sky Lord's glyph looks like this:

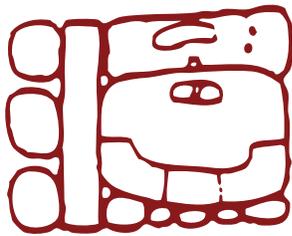


Maya number glyphs were also used to write dates that would appear on calendars. The Maya believe that the Earth was created on the day 4 Ahaw 8 Kumku, in the year 3114 B.C.E.

The date looks like this:



4 Ahaw



8 Kumku

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Under each glyph below, write the number represented within the glyph.
Remember that each hollow dot is worth one, and each bar is worth five.



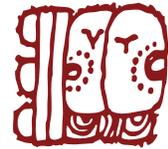
1) _____



2) _____



3) _____



4) _____



5) _____



6) _____



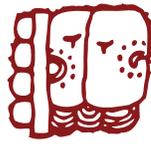
7) _____



8) _____



9) _____



10) _____



11) _____



12) _____



13) _____



14) _____



15) _____



16) _____



17) _____



18) _____



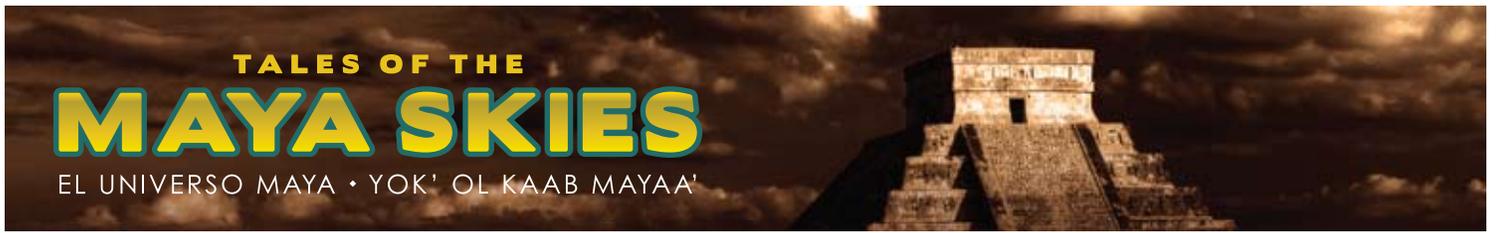
19) _____



20) _____

Answers 1) 8 2) 10 3) 3 4) 13 5) 9 6) 8 7) 5 8) 11 9) 5 10) 8 11) 13 12) 7 13) 16 14) 13 15) 3 16) 4 17) 5 18) 10 19) 12 20) 9

These activities have been adapted from those designed by the San Diego Museum of Man. They can be used to fulfill national education standards in Social Science (World History) and Mathematics. The activities fulfill California State Education Content Standards in History/Social Science for grade 7 (7.7.5), and Mathematics (Number Sense, Mathematical Reasoning) for grades 2 and up



THE MAYA LANGUAGE

Ancient Maya writing used hieroglyphs, pictorial representations, that were carved in stone and other materials, painted on pottery and murals, or written in books. Glyphs were used for writing, not for the purpose of decoration. The hieroglyphic code of the Maya was undecipherable to modern scholars until quite recently. Now it is understood that the Maya script was a logo-syllabic system. Individual symbols ("glyphs") could represent either a word or a syllable; indeed, the same glyph could often be used for both.

Maya glyphs appeared on the faces of buildings, on carvings, in books and murals. They described the everyday life of the cities and rulers and were also used to record astrological and astronomical events.

Maya scribes played a crucial role in the court as the keepers of information, as the commoners in ancient Maya society were most likely illiterate. It was the scribe's role to preserve the power of the king through writing. Scribes could be men or women, were in the upper class, and lived in luxury, beholden to the king.

There are about 30 vowel and consonant sounds in the Maya language.

VOWELS:

a sounds like "ah" as in father

e sounds like "eh" in left

i sounds like the double "ee" in tree

o sounds like the "o" in bone

u sounds like the double "oo" in zoo

CONSONANTS

b at the end of a word is pronounced as a **p**

c is always pronounced like the English **k**

ch is pronounced as **tsh**

j is pronounced as a hard **h**

l is almost silent at the end of a word

pp is pronounced as an explosive **p**

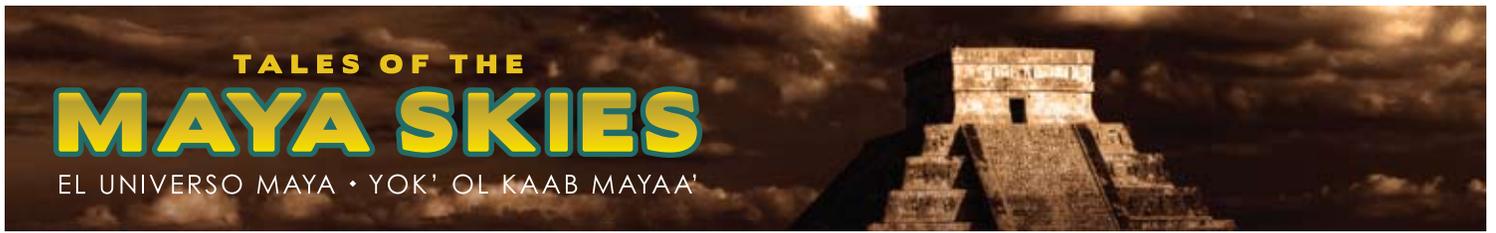
th is pronounced as an explosive **t**

ts is pronounced as the first **ch** in church

tz or **dz** is pronounced just as it looks

x is pronounced **sh**

A crop mark, ' , indicates a sudden stop between sounds.



MAYA LANGUAGE TODAY

There are more than seven million Maya living today in the Americas and Europe. They do not create glyphs as the ancients did, but their language is still unique.

30 Maya languages are spoken in Mesoamerica; 10 linguistic families with about 3 language variants each. People who speak languages from different linguistic families cannot typically understand each other. The ancient hieroglyphic script is most closely related to the following spoken languages today: Chorti (near Copan in Honduras), Yucatec (Yucatan peninsula), and Chol (near Palenque in Chiapas).

One of the largest linguistic groups speaks Yucatec Mayan.

Some examples of how English phrases would sound in Yucatec Mayan follow.

“Hi, how are you all?” in English would be **“Bix a belex”** in Maya (*pronounced Beesh ah behlehsh*)

“I am fine” in English would be **“Maloob”** (*pronounced Mah-lohb*)

“Thank you” in English would be **“Yum botic”** (*pronounced Yoom boh-teek*)

“You’re welcome” in English would be **“Mixba’a”** (*pronounced Meesh-ba-a*)

A Guatemalan poet Humberto Ak’abal wrote the following poems in the 1950’s. While the poems are not written in Yucatec Mayan, you can still practice your use of the Mayan language by reading them aloud referring to the pronunciation guide above. The Spanish and English translations follow.

Ri kaj

We kateq’an puwi’jum ri’j k’isis
we katopan pa ri utza’m ri uq’ab
kawilo chi ri uwächulew
man naj tl k’o wi che ri kaj.
Pa chuwitz’ap
katkuwinik kachapo.

Yaj, xyajik
Ri ik’ are ri jun nimalaj ja
t’uyul puwi’ri uworachak ri juyub’

Are chi’ru nutat kinnuyajo
Ri we in kin’e pa ri ik’
Chila kinwar wi.

El cielo

Si te encaramás a un Viejo ciprés
y trepás por sus ramas,
verás que la tierra
no está lejos del cielo.
En Momostenango
podrás tocarlo.

Regaño
La luna era una casa grande
sentada sobre el espinazo del cerro.

Cuando mi papá me reganaba,
yo me iba para la luna
Y allí dormía.

The sky

If you rise to the top of the old cypress
and climb onto its branches
you will see the Earth
It’s not so far from the sky.
In Momostenango
you can touch it.

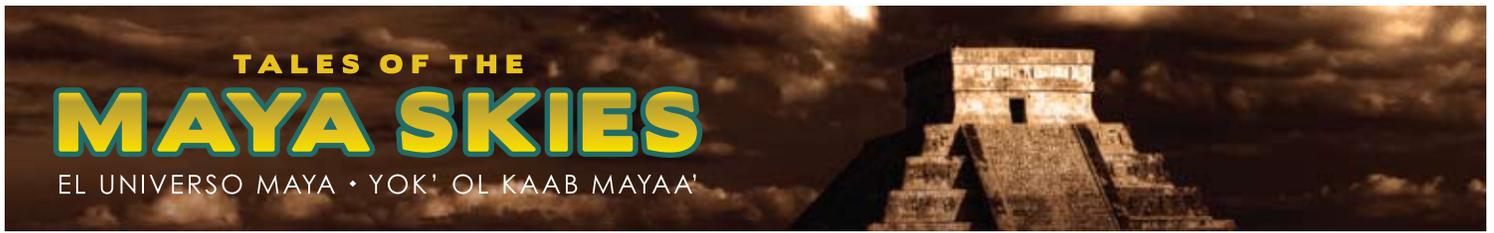
Scolding
The moon was a big house
sitting on the spine of the hill.

When my father scolded me
I went to the moon
And slept there.

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FURTHER READING

Books for Adults on Maya Astronomy, Art, Hieroglyphics, Calendrics and Mathematics

Aveni, Anthony, 2001. *Skywatchers*. University of Texas Press, Austin.

Aveni, Anthony, 1999. *Stairways to the Stars*. Wiley.

Aveni, Anthony, *The Sky in Mayan Literature*

Barnhart, Edwin L., 2004. *Reconstructing the Heavens: Archaeoastronomy and the Ancient Maya World (article)*.

Mercury magazine.

Burben, Fabio, 2001. *The Lost Cities of the Maya, The Life, Art and Discoveries of Frederick Catherwood*

Coe, Michael D, 2005. *The Maya (seventh edition)*

Coe, Michael D. *Breaking the Maya Code*

Freidel, David; Schele, Linda; Parker, Joy, 1993. *Maya Cosmos*. Quill, William Morrow and Company, New York.

Milbrath, Susan, 1999. *Star Gods of the Maya, Astronomy in Art, Folklore, and Calendars*. University of Texas Press. Austin.

Milbrath, Susan. *Maya Political Science: Time, Astronomy and the Cosmos*

Miller, Mary. *Maya Art and Architecture*

Reents-Budet, Dorie. *Painting the Maya Universe: Royal Ceramics of the Classic Period*. Duke University Museum of Art

Schele, Linda and Miller, Mary. *The Blood of Kings: Dynasty and Ritual in Maya Art*

Seife, Charles and Zimet, Matt. *Zero: The biography of a Dangerous Idea*

Tedlock, Dennis (translator), 1985. *Popol Vuh*

Documentaries on the Maya

Breaking the Maya Code, David LeBrun; this two-hour film, available on DVD, tells the story of the decades-long search for a decipherment of the Maya writing system.

Children's Books About the Maya

Aliki, *Corn is Maize: The Gift of the Indians*

Amado, Elisa and Hairs, Joya, *Barrilete: A Kite for the Day of the Dead*

Ancona, George, *Mayero, A Yucatec Maya Family*

Ashabranner, Brent and Conklin, Paul, *Children of the Maya, A Guatemala Indian Odyssey*

Bunting, Eve, *Going Home*

Castaneda, Omar, *Imagining Isabel*

Cory, Steve and Webb, Ray, *Daily Life in Ancient and Modern Mexico City*

Crandell, Rachel, *Hands of the Maya: Villagers at Work and Play*

Dupre, Judith and VandernBroeck, Fabricio, *The Mouse Bride: A Mayan Folk Tale*

Franklin, Kristine and McGirr, Nancy, *Out of the Dump: Writings and Photographs by Children from Guatemala*

Garcia, Guy, *Spirit of the Maya: A Boy Explores His Peoples Mysterious Past*

Gerson, Mary-Joan, *People of Corn: A Mayan Story*

Hinshaw, Dorothy, *Quetzal: Sacred Bird of the Cloud Forest*

Presilla, Maricel and Soto, Gloria, *Life Around the Lake*

Rhoads and Jean Charlot, *The Corn Grow Ripe*

Wisniewki, David, *Rain Player*

Wolf, Bernard, *Beneath the Stone: A Mexican Zapotec Tale*