

The Metonic 19 Year Lunar Cycle



The 19 Year Metonic Lunar Cycle Harmonizes with Solar Years.

In the fourth century A.D., Hillel II, head of the Sanhedrin, established a fixed calendar based on astronomical and mathematical calculations. This calendar, still used today by orthodox Jews, standardized the length of months and the rhythm of placement of the thirteenth month so that the lunar calendar realigns with the solar years over the course of a 19 year cycle. Adar I, the name of the 13th month, is added in the 3rd, 6th, 8th, 11th, 14th, 17th and 19th years of the cycle.

Whether you are musically inclined or not, you may find it helpful to remember how the Metonic cycle works as it is aptly represented by the major scale displayed on a piano keyboard. It may also be easier to simply apply each set of three years to the black keys, and a set of two years for each break between the black keys.

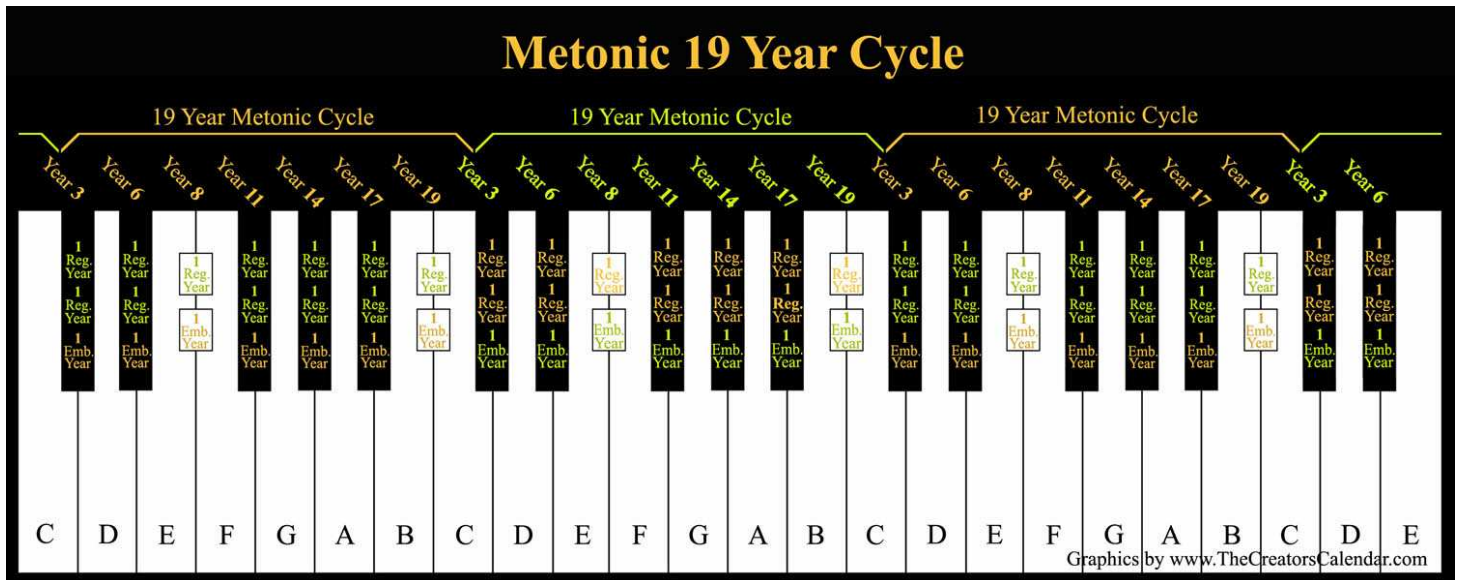
- For each whole step there are two regular years and one thirteen month year: **2 + 1**. In other words, each black key represents three years in a row, with every third year being an embolismic or leap year.
- For each half step there is one regular year and an embolismic year: **1 + 1**. In other words where there is a gap between two and three black keys, this is the placement for one regular year followed by one thirteen month year.

Please examine the keyboard graphic below that illustrates the rhythm and succession of both regular 12 month years and 13 month embolismic years.

Application

Traditionally, the years **3, 6, 8, 11, 14, 17, and 19** are embolismic years, because they each have the added 13th intercalary month in the sequence of the Metonic cycle. This cycle is said to be so accurate that it can be used to predict eclipses in addition to forming the basis of the Biblical lunisolar calendar. Perhaps it can best be illustrated by using a

piano keyboard. The cycle commences with what would be known as C# (the black key between C and D) and ends with the 19th embolismic year, that would fall between B and C.



Do the Math

Meton, the Greek astronomer, observed that a period of 19 years is nearly exactly equal to 235 synodic lunar months, and when rounded to full days, counts 6940 days. There are only a few hours difference between the two periods of 19 years and 235 synodic lunar months.

A year is 1/19th of this 6940-day cycle and is $365 + 1/4 + 1/76$ days long. An unrounded cycle is much more accurate, and is just slightly more than 12 synodic months. To keep a 12-month lunar year in pace with the solar year, an intercalary 13th month must be added on seven specific occasions during the nineteen-year period. Meton introduced the Metonic cycle in 432 BC, but it is believed to have been used by the Babylonian astronomers much earlier.

This Metonic cycle has been utilized in the Babylonian calendar; the *medieval computus*, which is the Papal calculation of the date for *Easter*; and still today it regulates the 19-year cycle of intercalary lunar months in the Biblical Hebrew calendar.

It is believed by many, that the current cycle began in Jewish year 5758, and commenced on October 2, 1997. However, this does not seem to harmonize with the lunar signs that depict the beginning of each New Year in Spring and the second witness of the Barley Harvest. Somebody is Wrong! The jury is still out on the correct beginning of the cycle.