

CALCULATIONS FOR THE MOON VARIATION VS SOLAR YEAR LENGTH

Solar Year (aka Tropical Year, or Year of the Seasons) is the time between two successive occurrences of the vernal equinox (day and night are \approx equal in length).

Solar Year length is \approx 365 days, 5 hours, 48 minutes, 46 seconds or 365.2422 days.

[1 hour = 3600 seconds (60 seconds x 60 minutes)]

[1 day = 86,400 seconds (3600 x 24)]

[5 hours = 18,000 seconds (3600 x 5 = 18,000)]

[48 minutes = 2,880 seconds (48 x 60)]

Adding up all the seconds: $18,000 + 2,880 + 46 = 20,926$ seconds.

$20,926$ divided by $86,400 = 2.4219907$ or $.2422$

Moon Cycle (aka lunar cycle, lunation, lunar month, or synodic month) is the span of time between one new moon and the next. On average this is 29.53059 days.

The following is for the variance between the solar year length of 365.2422 days and the length of the moon cycle of 29.53059 days.

Time in days for the **first solar nineteen years** is $19 \times 365.2422 = 6939.6018$.

The number of months (moon cycles) for the same nineteen-year period is $19 \times 12 = 228$. Add seven months for the 13-month years. $228 + 7 = 235$ [There are 12 years with 12 months, and 7 years of 13 months in every 19-year cycle.]

The number of days in the **first 235 months** is $235 \times 29.53059 = 6939.68865$. 6939.68865 minus $6939.6018 = 0.08685$ of a day for each nineteen years.

At the end of 13 nineteen-year cycles there are $13 \times 0.08685 = 1.12905$ days that the moon has traveled past the alignment between the sun and the earth. This is what Chart 6 shows at the bottom of the first thirteen nineteen-year time cycles.

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