Part 3: Chronological symbolism in the small plates of Nephi: Number-term analysis

3.1 Descriptive terms and assumptions

The examination of chronological symbolism in the small plates of Nephi now focuses on the number-terms. As previous Parts of this study have indicated, a number-term is an integral part of a complex chronological communication. A number-term is one of three possible components of a year-related expression, which itself is one of two elements of a temporal-expression, the other being a narrative-link. A temporal-expression is connected with its associated narrative and that narrative appears in a major division of one of the three principal sets of plates mentioned in the *Book of Mormon*. Because of the single number-term that appears in the Words of Mormon (a major division of the small plates of Nephi), at least one number-term occurs in every major division of the *Book of Mormon*. Thus, a number-term may be analyzed for meaning with respect to its individual diction and each of the broader contexts of that diction: year-related expression, temporal-expression, associated narrative, major division, and set of plates.

In the small plates of Nephi, a cardinal or ordinal number name, or other quantitative name or reference, appears 28 times in the physical position of a number-term, i.e., immediately before a year-term. The diction of these 28 number-terms has been sorted into five types: stated ordinal name (1 instance); stated cardinal name (14 instances); referenced ordinal name (3 instances); referenced cardinal name (7 instances); and referenced general name (3 instances). For analytical purposes, a sixth type of number-term (called "absent") was created to account for the 29th temporal-expression in the small plates ("in years"); however, in the proposed structure of the number-terms in these plates, the absent number-term plays no part. The previous analyses of number-terms were focused primarily on diction, typology, and placement.[1]

As Part 1 of this Division concluded, Nephi_1's writing process does not appear to have involved merely taking parts of his comprehensive history or the brass plates and putting the extracts into a simple chronological order. Instead, Nephi_1's writings appear to have been carefully composed and fitted within a complex chronological design. The choice of diction for each temporal-expression, the complexity of the placement of temporal-expressions, and the purposes behind all these decisions seem most likely to have been planned precisely.

As to his number-term diction, Nephi_1 apparently began with at least four, and possibly five, expressions that were predetermined by the writings of Lehi_1 and Isaiah_1. The number-terms Nephi_1 quoted from these two writers gave him three types of number-term diction: a stated ordinal number-term, a stated cardinal number-term, and a referenced ordinal number-term. To these, Nephi_1 added three more types of number-term diction: a referenced cardinal number-term, a referenced general number-term, and an absent number-term.

In addition, when Nephi_1 transferred the small plates to Jacob_2, "the things which [his] brother Nephi had commanded"[2] apparently included strict adherence to Nephi_1's chronological

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[1] See Division 1, Part 4, and Division 2, Part 1, Section 1.7.

[2] Jacob 7:27.

design for describing the passage of time in the Lehi era context. As to number-terms, that plan appears to have required only the use of stated cardinal and referenced ordinal or cardinal number-terms in some sort of alternating, balanced, and reversible way in all subsequent temporal-expressions. To assist in the following discussions, reference may be made to Table 2.A of this Division, which lists the diction, language types, and placement patterns of temporal-expressions throughout the major divisions of the small plates of Nephi.

Building on the proposals regarding chronological structure, this Part 3 suggests that number-terms evidence at least two purposes related to the various writers' communication of chronology. First, many number-terms in the small plates of Nephi appear to have been intentionally composed to quantify the passage of years in the Lehi era context. This most basic purpose is evident in the diction of the temporal-expressions. However, a second purpose of the writers' design is suggested by the analysis in this Part. This symbolic aspect of number-terms seems central to the intentions of the record keepers, but perhaps is missed or misunderstood by most readers. In the following analysis, the diction of individual number-terms is interpreted in terms of its contribution to the combined meanings of related number-terms.

3.1.1 Textual sorting

One of the basic assumptions used previously in this study is that the components and elements of temporal-expressions may be sorted into various groups based on statements made by the writers. The textual groups have been based on the diction the writers used for their year-, time-, and number-terms, and their narrative-links. Other textual groups have been based on language types and on the way such types were placed in the writers' narratives. In this Part 3, the examination of number-terms for meaning is based on their express or absent diction, and on other textual groups previously identified in the analysis of chronological structure and symbolism. Since the use of year-, time-, and number-terms, and narrative-links, seemed to exhibit organized literary decision-making (separately within each of the three principal sets of plates) and since era contexts seemed to be expressed by the diction of combined time-terms ("Lehi left Jerusalem", "the reign of the judges" or "the coming of Christ"), this study suggests that number-terms may be analyzed similarly for chronological meanings symbolized by combined number-term diction.

Number-terms in the small plates of Nephi are assumed to be separate from number-terms in the other two principal sets of plates because the stated times of the writers of the small plates (except for the Words of Mormon) are described as being hundreds of years before the times of $Mormon_2$ and $Moroni_2$.[3] The number-terms in the small plates also are assumed to be sorted into seven textual groups based on the express titles of, and initial writers identified in, the major divisions of these plates.[4] Furthermore, inherent in the analysis of major divisions, their titles, and their authors is the recognition that some texts clearly identify other writers.[5] These texts may be used to sort number-terms into groups similar to the groups sorted by the major divisions. $Nephi_1$ composed two major divisions. In his first major division, he appears to have

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[3] E.g., 1 Nephi 1:4; 7:3-15; 2 Nephi 5:28, 34; Jacob 1:1; Enos 1:25; Jarom 1:5, 13; Omni 1:3, 5; Words of Mormon 1:2; 4 Nephi 1:48; Mormon 1:2; 6:5; 8:6; Moroni 10:1.

[4] See Division 10, Part 3.

[5] E.g., 1 Nephi 1:17; 10:1-16; 2 Nephi 5:29; 6:1; 11:1-2.

quoted at least two number-terms from his father's writings[6] and, in his second major division, he quoted three number-terms from the Book of Isaiah.[7] Furthermore, two writers, a father and son, both placed number-terms in the same major division, the Book of Omni.[8] Hence, number-terms sorted on the basis of authorship sometimes occur in groups that seem identical to major division groups, but most of the writers' groups proposed in the following analysis differ from those of the major divisions.

3.1.2 Addition of cardinal numbers

Another basic assumption used in the following analysis is that the number names in each proposed textual group may be combined by addition. The resulting sum is an entirely new number name, except in those instances where a defined group includes only one number name. In Division 1, the arithmetic operation of addition was shown to be present in the *Book of Mormon*; so, its use in combining number names has a textual basis.[9] Moreover, several examples of the verbal addition of ordinal and cardinal number names were examined.[10] The narratives describing those operations of addition provided language settings in which ordinal and cardinal number names both made sense. However, the use of ordinal and cardinal number names in an arithmetic operation that is detached from narrative contexts seemed to be unnecessarily complex and potentially confusing. Thus, two practices for depicting numbers in proposed textual groups were adopted in Division 1 to enhance the simplicity and clarity of additions, and those practices are continued in this Part. When an ordinal number name is removed from its associated narrative and placed in an abstract numerical combination, the ordinal name is converted to a cardinal name; e.g., "the first" = one. Also, to simplify the presentation of combinations, cardinal number names often are represented by Arabic numerals; e.g., one = 1.

3.1.3 Definite numbers of natural days

A third basic assumption in the following analysis was introduced in Part 4 of Division 1. The sum (called a Set-sum) of a proposed combination of number names in a group of number-terms (called a Set) was deemed to represent a definite number of natural days with chronological meaning. Several Sets representing number-terms in a few major divisions of the small plates were provided as examples that suggested this assumption might be justified by the text.[11] In the following analysis of number-terms, this assumption is examined many times and the implications are discussed. Initially, the investigation of each major division is carried out separately. In addition, because $Nephi_1$'s writings were grouped into two major divisions, the examination also analyzes $Nephi_1$'s writings as though they could be understood as a single major division. The chronological structure of his writings (discussed in Part 1 of this Division)

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[6] 1 Nephi 1:4; 10:4.

[7] 2 Nephi 16:1; 17:8; 24:28.

[8] Omni 1:3, 5.

[9] See Division 1, Part 4, Section 4.4.1.

[10] Alma 16:9, 12, 21 (11th + 3 = 14th); Alma 17:4, 6; 28:7 (1st + 14 = 15th); Alma 28:9-10; 46:38; 48:20; 49:29 (15th + 4 = 19th); Helaman 13:1; 14:2; 16:9; 3 Nephi 1:1 (86th + 5 = 91st); 3 Nephi 2:8, 10 (9 + 1 = 10th); 3 Nephi 4:1, 4;5:7-8; 6:1 (18th + 7 = 25th); 3 Nephi 5:7-8; 7:1, 8 (25th + 5 = 30th); Mormon 2:28; 3:1, 4 (350th + 10 or 10th = 360).

[11] See Division 1, Part 4, Section 4.10.

and the proposed symbolism of his diction, language types, and placement patterns (discussed in Part 2 of this Division) all suggest this composite analysis of number-terms in $Nephi_1$'s writings. This Part will then investigate groups of number-terms based on authorship. Thus, each proposed combination or group of number names occurs as a consequence of a textual sorting based on a specific set of plates, a major division within that set of plates, and/or the authorship of a certain number-term. For each proposed combination or group of number-terms, the Set-sum is deemed to represent a certain number of natural days with symbolic astronomical, calendrical, and/or other temporal meanings.

3.1.4 Sets, Set-sums, and Set-contexts

As introduced in Part 4 of Division 1 of this source book, number names expressed or referenced in number-terms may be grouped and the combination of their meanings (their sum) may symbolize a chronological system. This additive process involving number names was suggested by the way that most time-term diction appeared to be sorted into three groups and the combination of the meanings of time-terms in each group seemed to symbolize a Nephite chronological system that was called an "era". The hypothesis is that the adjectives of year-related expressions may be fully understood through the use of a combinatory or additive process. With combinations of number-terms, each proposed textual group has been called a "Set". The combination of the meanings of number names associated with a Set usually is arrived at by addition and is called a "Set-sum".

Furthermore, just as an "era context" was defined in Division 1 as an interval that began with a unique event on the first day of an era and continued for many years, at least until a day in the last numbered year implied in connection with the era's express time-terms, the term "Set-context" was defined as an interval that began with a unique event on a certain day and continued for many days, until another day symbolized by the Set-sum. While an era context symbolizes one of the longest of the chronological periods understood by the Nephites, a Set-context symbolizes a period much shorter than an era context. Thus, as proposed in Division 1, a Set of number-terms appears to produce a Set-sum that represents a number of natural days and those natural days symbolize a Set-context or chronological system shorter than an era. In addition, this study proposes that Set-contexts imply aspects of Nephite chronological culture that support the writers' reports that certain numbers of years in an era context had been accurately observed, quantified, and recorded.

The descriptive terms Set, Set-sum, and Set-context are capitalized to indicate their specific use in connection with the analysis of number-terms. The noun *context* again is used in a normal way, as "[t]he whole structure of a connected passage regarded in its bearing upon any of the parts which constitute it".[12] The nouns *set* and *sum*, however, are used in somewhat unique ways. The word *set* may be defined as "[a] number of things grouped together according to a system of classification or conceived as forming a whole".[13] The capitalized word Set normally means a collection of number-terms, but some methods of grouping number-terms may produce a Set that has just one number-term that is textually unique. For example, $Mormon_2$ composed a single temporal-expression for the Words of Mormon. Thus, sorting number-terms in the small plates

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[12] *The Compact Edition of the Oxford English Dictionary*, I: 536 (context).

[13] Ibid., II: 2745 (set).

of Nephi on the basis of major divisions produces a Set for the Words of Mormon that has just one number-term. Similarly, the mathematical meaning of the noun *sum* is "[t]he number, quantity, or magnitude resulting from the addition of two or more numbers, quantities, or magnitudes".[14] In most cases, a Set-sum is the number name resulting from identifying two or more number names in the number-terms of a Set and then adding such number names. However, as noted above with respect to the Words of Mormon, a Set may contain a single number-term related to a single number name. In such cases, that number name is understood to be the Set-sum, even though the operation of addition has not been required.[15]

3.1.5 Incidental combinations

This study makes a distinction between a Set, Set-sum, and Set-context that its composer intended and an incidental combination of number names, their associated sum, and perhaps a commensuration of such sum with the quantitative length of a particular astronomical or calendrical interval. This distinction between intentional and incidental combinations is central to the analysis of number-terms. To illustrate this distinction, an example based on a group of writers may be examined. The writings of $Jacob_2$ and his descendants (eight writers) appear in the small plates of Nephi. Their writings are separated into four major divisions, the books of Jacob, Enos, Jarom, and Omni. The first five of these eight authors composed a total of 11 number-terms, but the latter three chose not to compose number-terms. Seven of the 11 number-terms are expressed with stated number names, such as "fifty and five", "two hundred", and "three hundred and twenty". The other four number-terms use less precise quantitative words ("many hundred" (twice), "many", and "some") that seem to imply number names.

If number-terms are sorted by writers, so that the two books written by $Nephi_1$ and the "Words" composed by $Mormon_2$ are deemed to be separate from the grouped books of $Jacob_2$ and his descendants, then the seven stated number names composed by $Jacob_2$ and his descendants may be examined by themselves and by adding them into 120 possible combinations of two or more number names. This process assumes that the number name expressed in a number-term is not used twice within any one combination. Additionally, if $Jacob_2$'s first "many hundred" number-term were deemed to represent 500, so that eight numbers were being combined, that number name by itself and an additional 127 possible combinations would occur (for a total of 255 numbers to be examined). If his other "many hundred" number-term were deemed to represent another 500, so that nine numbers were being combined, that number name by itself (having an origin in a separate number-term) and an additional 255 possible combinations would occur (for a total of 511 numbers to be examined). If the number-term "many" recorded by Enos also were deemed to represent 500, so that ten numbers were being combined, that number name by itself (also having an origin in a separate number-term) and an additional 511 possible combinations would occur (for a total of 1023 numbers to be examined). Then, if the number-term "some" recorded by $Jacob_2$ were deemed to represent a number name (as yet unsourced in this study), so that 11 numbers were being combined, that number name by itself and an additional 1023 possible combinations would occur (for a total of 2047 numbers to be examined). This rapid proliferation of possible combinations requires that interpretative

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[14] Ibid., II: 3149 (sum).

[15] See Section 3.13 below regarding the analysis of the number-term in the Words of Mormon.

caution be used in sorting number names into possible combinations and then calling those combinations Sets. That is, Sets and Set-sums intended by the writers must be distinguished in some rational manner from incidental combinations of number names and their sums. In this study, the rational foundation for dividing Sets from ancillary combinations is the Yale text, the earliest text of the *Book of Mormon*.

To illustrate this interpretative issue regarding the writers' intentions, a group of examples related to the above-mentioned proliferation of combinations may be examined. The sum 2481 is obtained by combining the proposed quantification of $Jacob_2$'s two "many hundred" number-terms (500 and 500), both of Enos's number-terms (a possible 500 and a stated 179), Jarom's first number-term (200), Omni's second number-term (282), and Amaron's only number-term (320). When the sum 2481 is assumed to represent a number of natural days, a "close" commensuration or accord occurs with the length of seven 12-month lunar years, as measured with mean synodic months (about 2480.569 days). The difference in the two numbers of days is just 0.431 days. As to chronological intervals, this study defines a quantitative commensuration or accord as "close" when the difference in two intervals, if any, is less than one natural day, and as "near" when the difference in two intervals is one or more days, but less than two days. Both close and near commensurations or accords are assumed to have been visible to, and quantifiable by, dedicated observers using so-called "unaided" or "naked-eye" observations.

Is the combination and sum represented by the equation 500+500+500+179+200+282+320 = 2481 to be considered intentional or incidental? The fact of a close accord between 2481 natural days and seven 12-month years cannot be the deciding factor. When Amaron's number-term was included with the ten previous number-terms in the writings of $Jacob_2$ and his descendants, the number name 320 and an additional 1023 combination sums became possible numbers to be examined. The equation 500+500+500+179+200+282+320 = 2481 represents just one of the suggested combinations that may be created by the use of Amaron's number-term. A similar equation 500+500+500+179+200+276+320 = 2475 is another of these combinations (Omni's 276 is used in this combination, rather than his 282). A period of 2475 days is the equivalent of 275 9-day cycles and that interval suggests a near accord with a lunar period of 91 mean draconic months (about 2476.312 days). The difference in the two numbers of days is just 1.312 days. Another equation 500+500+179+200+282+320 = 1981 is a third of the suggested combinations (a 500 of $Jacob_2$ or Enos is not used in this combination). A period of 1981 days is the equivalent of 283 7-day weeks, but this period does not appear to suggest a near or close accord with other astronomical or calendrical periods visible to, or calculable from, "naked-eye" observations. A fourth example of the 1023 combinations made possible by Amaron's number-term is represented by the equation 500+500+500+179+282+320 = 2281 (Jarom's 200 is not used in this combination). A period of 2281 days is not the equivalent of smaller cycles of days (such as a 7-day week or a 9-day cycle) because 2281 is a prime number. A period of 2281 days also does not appear to present a near or close accord with an astronomical or calendrical period visible to, or calculable from, "unaided" observations.

For the 1023 combinations made possible by Amaron's number-term being combined with the ten number-terms of his father and other ancestors, hundreds of sums could be interpreted as equating with smaller cycles of days or as having near or close accords with astronomical periods, and hundreds more cannot be so interpreted. Amaron likely did not intend hundreds of combinations to be considered intentional Sets. For each of the 1023 possible combinations that includes Amaron's number-term, one must be able to determine whether the combination was intended by him (and thus, a Set) or merely incidental. The reason for focusing on Amaron is

that his number-term is the last to have been written by a descendant of $Jacob_2$. In accordance with the requirement of a text-based analysis, the deciding factor as to Amaron's intentions regarding all these potential combinations is the text that he composed.

Is there any indication in the writings of Amaron that he intended his 320 to be combined into any of the suggested 1023 combinations? The answer appears to be "yes". However, it must be emphasized that a "yes" answer is not dependent on, or derived from, near or close commensurations with other chronological intervals. The answer "yes" is dependent on the text of the small plates of Nephi. In part, the answer is derived from Amaron's statement, "And now I Amaron write … in the book of my father".[16] Unlike $Nephi_1$ (who composed two distinct books for his writings), unlike Amaron's grandfather Jarom and other ancestors, $Jacob_2$ and Enos (each of whom composed a separate book for his writings), and unlike his own father Omni (who composed a book for his writings), Amaron chose to "write … in the book of [his] father". Amaron's clear statement of intention or choice appears immediately before he also noted that "three hundred and twenty years had passed". This temporal-expression has structure and meaning. With both of these statements, Amaron placed his number-term in a book that already contained his father's two number-terms. The implication seems to be that the location of Amaron's number-term in the text, at least with respect to its major division, had meaning for him and presumably for the following writers as well. Every later writer who was a descendant of $Jacob_2$ also wrote in the Book of Omni, but none of them added another temporal-expression.

Thus, Amaron certainly intended his number-term to be considered by itself, as a definite number quantifying the years that had passed; however, he also intended it to be understood as part of his father's book. The implication may be that it would be combined with his father's number-terms. His statement suggests three possible combinations with his father's number-terms: 276+320 = 596; 282+320 = 602; and/or 276+282+320 = 878. How are these combinations to be categorized in terms of Amaron's intentions and potential Sets? The detailed analysis of that question, in terms of the text of the small plates of Nephi, is undertaken later in this Part 3.

3.1.6 Unaided or naked-eye observation

With the foregoing references to so-called "unaided" or "naked-eye" observations of the heavens, a few introductory issues should be noted. Unaided or naked-eye observations of the sky are ones during which the observer uses no telescopic device. This distinction does not mean that other resources and tools are not employed to aid human eyes. Such aid is often needed because naked-eye observation of the heavens may be blocked or distorted. Mountains, hills, and trees may create obstacles to accurate observation of the sun, moon, planets, and stars. Clouds and fog sometimes shroud the sky and horizons. Light and smoke from fires also may conceal heavenly bodies. Even in a clear sky, the atmosphere bends light rays, especially near the horizon. This refraction causes stars and planets to appear slightly higher than their true positions in the sky. Rising and setting positions of astronomical bodies at the horizon sometimes change so little from one day or night to the next that their movement is almost imperceptible, yet movement occurs. The sun's glare causes the moon, planets, and stars to vanish when they seem to move into the area of the sky where the sun appears to be. With the exceptions of the moon and planet Venus during certain of their phases, other astronomical bodies disappear in the sun's

[16] Omni 1:4.

brightness in the daytime sky. Mercury is not easy to observe or measure because its apparent motion is both near the sun and relatively rapid. Slight orbital distortions of the moon and planets help to cause variations from the lengths of their mean or average periods. For example, the mean synodic period of the planet Venus is about 583.922 days, but this period varies from as many as 588.1 days to as few as 579.6 days, a range of about 8.5 days.[17] Such factors, together with many other natural, personal, and group issues related to the place and time of observation, may influence naked-eye study and measurement of the heavens.

Thus, ancient peoples who relied on naked-eye observation and still developed a noteworthy degree of accurate astronomical knowledge may be assumed to have organized their observational activities. To assist their "unaided" observations, such resources as an agricultural surplus, a division of labor that included regimented observers and record keepers, language and number symbols, record keeping protocols and tools, and mathematical methods and skills likely all had to be employed. Such peoples may have developed and used observational devices such as sighting lines and gnomons. They may have found or created particularly advantageous viewpoints from which they could most readily view the heavens and horizons. Moreover, they must have devotedly studied the sky for a significant length of time to overcome and account for observational and measurement variations and difficulties.

The creation and employment of such aids to observation seem to have begun to occur in ancient Mesoamerica hundreds, if not thousands,[18] of years before the sixth century BCE when the founding of $Nephi_1$'s people may have occurred. Beginning around 1000 BCE, if not earlier, consistently placed structures were built apparently to give durable sighting lines to the rising of the sun at the equinoxes and solstices.[19] Such alignments, in addition to their use for observing and recording the appearance of the sun on the eastern horizon, certainly could have been used to observe and record some of the motions of the moon, planets, and fixed stars.

3.1.7 Lunar and planetary periods

This study compares proposed numbers of days symbolized by number-terms and their combination sums with 47 different chronological intervals listed in Table 3.A of this Division. The natural temporal patterns associated with these intervals could have been observed, calculated, and recorded by dedicated observers. Sources of information about these intervals are indicated in the "Notes" that accompany the table.

Table 3.A lists synodic, sidereal, and draconic months as the three shorter intervals perhaps observed in connection with the moon. A synodic month is the time necessary for the moon to return to the same point in the sky relative to the sun (such as a full moon), when observed from

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[17] William D. Stahlman and Owen Gingerich, *Solar and Planetary Longitudes for Years -2500 to +2000* (Madison: University of Wisconsin Press, 1963), xv; Anthony F. Aveni, *Skywatchers of Ancient Mexico* (Austin: University of Texas Press, 1980), 324 n.12.

[18] "In northwestern Mexico . . . (2000-3000 B.C.), we find carved on stone similar patterns that can be interpreted as lunar calendrical tallies. These appear alongside 'lists' of weapons and kills. The Presa de la Mula stone . . . is a particularly interesting example. . . . Several dot-and-line grids appear to register not only the standard lunar month ranging between 27 and 30 days, but also multiples of that period. In several instances, the number 207 crops up; if each stroke mark represents a day, the total duration is just equal to 7 lunar months, a length that could represent the seasonal occupation of the area by the tribe; or, less likely, it could even be a lunar semester employed to predict eclipses." Aveni, *Empires of Time*, 71. See also J.D. Stewart, "Structural Evidence of a Luni-Solar Calendar in Ancient Mesoamerica," *Estudios de Cultura Nahuatl* 17 (1984):171-191, accessed at historicas.unam.mx/publicaciones/revistas/nahuatl/pdf/ecn17/270.pdf.

[19] E.g., David A. Freidel, Arlen F. Chase, Anne S. Dowd, and Jerry Murdock, eds., *Maya E Groups: Calendars, Astronomy, and Urbanism in the Early Lowlands* (Gainesville, Florida: University Press of Florida, 2017).

the same place on earth. One mean synodic month requires about 29.53059 days. However, primarily due to variations in the orbits of the earth and moon, the length of a single synodic month may be as short as about 29.26 days or as long as about 29.8 days. Because "the length of the synodic month varies and the time required for crescent visibility also varies, it is quite possible to have two 30-day months or two 29-day months in a row … [or] three 29-day months in a row … [or] three, at times four, and very rarely five 30-day months in a row".[20] A sidereal month is the time necessary for the moon to return to the same point in the fixed stars, as seen from the same location on earth. The mean length of a sidereal month is about 27.32166 days; however, primarily due to variations in the earth's and moon's orbits, individual sidereal months vary in length from about 27.18 days to about 27.47 days.[21]

Because the apparent movements of the sun and moon through the heavens are at a slight angle to each other, their tracks or paths through the stars appear to cross twice, at conceptual points called "nodes". The movement of the moon along its path appears to reach a node about every 13.60611 days (an interval known as a mean half-draconic month). In a single mean draconic month, the moon appears to travel from one node to the other node and then to the original node again in about 27.21222 days. Again, however, primarily due to orbital variations, draconic months vary in length from about 27.004 days to about 27.487 days. The mean interval for the sun to move from one node to the other is about 173.31 days. This interval is nearly four days shorter than a mean semester of six synodic months (about 177.184 days). Near either node, the apparent positions of the moon and sun occasionally are in opposition and result in a lunar eclipse (with the moon fully or partially in the shadow of the earth) or their positions sometimes are in conjunction and result in a solar eclipse (with the moon blocking all or part the surface of the sun). Because the draconic month is a bit shorter than the sidereal month, the nodes gradually appear to move west and do not return to the same place in the fixed stars for about 18.6 tropical years (6793.48 days).[22] These three aspects of lunar observation and measurements of lunar months (synodic, sidereal, and draconic) are said to be *geocentric* (*geo-* meaning "relating to the earth").[23] Their accurate measurement through the use of naked-eye observation requires them to be viewed from the same place on earth.

As with observation of the moon, naked-eye observation of Mercury, Venus, Mars, Jupiter, and Saturn (the five "bright" planets regularly visible to such observation)[24] may have been used to define at least two distinct periods for each planet. The synodic period of a planet is the time necessary for it to return to the same point in the sky relative to the sun, as observed from the same place on earth. The calculation of a mean synodic period of a planet also requires geocentric observation, record keeping, and calculation because the synodic period of a planet also varies in length. As noted above, the mean synodic period of Venus is about 583.92166 days, but the period varies from as many as 588.1 days to as few as 579.6 days, a range of about

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[20] Parker, *The Calendars of Ancient Egypt*, 4, 6.

[21] Ibid., 2; "Eclipses and the Moon's Orbit," in the NASA Eclipse Web Site, accessed at eclipse.gsfc.nasa.gov/SEhelp/moonorbit.html.

[22] "Eclipses and the Moon's Orbit," in the NASA Eclipse Web Site; Grofe, "Glyphs G and F: the cycle of nine, the lunar nodes, and the draconic month", 135-156.

[23] *The Compact Edition of the Oxford English Dictionary*, I: 1132 (geo-) (geocentric).

[24] Uranus may occasionally be visible to the naked-eye during its maximum apparent magnitude. David H. Levy, *THE SKY—A User's Guide* (Cambridge: Cambridge University Press, 1991), 134; Patrick Moore, *Naked-eye Astronomy* (New York: W.W. Norton, 1965), 177. However, since Uranus is usually not visible, it seems unlikely that the ancients observed and calculated its periods.

8.5 days. The variability of astronomical periods is a principal reason that this study refers to both close and near accords with definite numbers of days suggested by the proposed Set-sums.

The second proposed period associated with the movements of planets is called the sidereal period. Typically, modern astronomy defines the sidereal period of a planet as the time necessary for the planet to return to the same point in the fixed stars, as reckoned from the center of the sun, rather than from the same place on earth. This kind of period is said to be *heliocentric* (*helio-* meaning "relating to the sun").[25] A heliocentric sidereal period of a planet apparently assumes that the observer is aware that planets revolve around the sun, rather than around the earth. While this awareness is quite common today, it seems unlikely that ancient astronomers understood and measured the sidereal period of a planet like modern astronomers do.

For many decades, the idea that sidereal periods of the planets were observed and measured in ancient Mesoamerica was not favored. David H. Kelley stated in 1980 that J. Eric S. Thompson, in 1954, had followed Lawrence Roys' 1937 conclusions to emphasize "the difficulty of determining the sidereal period of the planets, a difficulty that has been accepted as insurmountable by many Mayanists but which [Kelley thought had] been grossly exaggerated". Kelley also noted that the ancient Greeks, based on "the assumption of a geocentric universe" and "direct observation", appeared to have been able to measure both the synodic and sidereal periods of Mars, Jupiter, and Saturn. Kelley proposed that ancient Mesoamericans could have defined a "close approximation to the sidereal periods" of the five bright planets if their observations were "systematized in terms of the cyclical return to some specified seasonal point, such as the equinoxes or solstices (which, in the heliocentric interpretation, means that the Earth has returned geometrically to the same point)". Kelley further suggested that because "spring is generally the dry season and summer and autumn are wet" in Mesoamerica, "observations are much more likely to be possible at the spring equinox".[26]

In 2003, Anthony F. Aveni, Harvey M. Bricker, and Victoria R. Bricker published research regarding a hypothetical sidereal period measurement system based on quantifiable geocentric observations that could have existed in ancient Mesoamerica. For the period from 500 to 1000 CE, they tracked "planetary motion using modern astronomical ephemerides". In addition, they proposed that the Dresden Codex, one of the few surviving ancient Maya bark paper books, included tabular evidence of the measurement of the sidereal period of Mars.[27] Table 3.B of this Division summarizes the alternating patterns and data discovered with respect to the hypothetical observational system proposed by Aveni, Bricker, and Bricker.[28] Table 3.B also includes this source book's calculation of the *geocentric* mean sidereal periods of the five bright planets based on such observational patterns and data. In the following discussions of Set-contexts, this study uses the modern estimates of mean sidereal periods of the bright planets set forth in Table 3.A, rather than the hypothesized periods suggested by the data of Aveni, Bricker, and Bricker. They limited their investigation to just 500 years. Ancient Mesoamerican astronomers appear to have been studying the heavens and establishing architectural sighting lines associated with the

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[25] *The Compact Edition of the Oxford English Dictionary*, I: 1284-85 (helio-) (heliocentric).

[26] David H. Kelley, "Astronomical Identities of Mesoamerican Gods," *Journal for the History of Astronomy*, Archaeoastronomy Supplement, 11/2 (1980): S2-S3, accessed at ui.adsabs.harvard.edu.

[27] Anthony F. Aveni, Harvey M. Bricker, and Victoria R. Bricker, "Seeking the Sidereal: Observable Planetary Stations and the Ancient Maya Record," *Journal for the History of Astronomy*, 34/2/115 (2003): 145-61, accessed at ui.adsabs.harvard.edu.

[28] Ibid., 146-53.

solstices and equinoxes for at least 1500 years prior to 500 CE, the beginning date in the research of Aveni, Bricker, and Bricker.

3.2 The Book of Nephi [First Nephi] number-terms

The analysis of number-terms begins with $Nephi_1$'s first book, the most complex of the seven major divisions in the small plates. The book known as First Nephi or 1 Nephi includes ten temporal-expressions with express number-terms and a single temporal-expression with no number-term. The express number-terms create the number-term letter pattern that continues into $Nephi_1$'s second book and that appears to symbolize a synodic month.[29] The diction, language types, and positions of the ten express number-terms occur in the following order:

1. "the first", a stated ordinal or K number-term that is unique in the small plates and implies the darkness of the astronomical new moon that, at least in an Egyptian chronological system, began a synodic month;
2. "that same", a referenced ordinal or M number-term that seems to symbolize the first visible crescent of a synodic month and may imply the beginning of a synodic month in a Mesopotamian chronological system, such as existed in the kingdom of Judah;
3. "even six hundred", a stated cardinal or L number-term that contains a specifying adverb *even*, which may have been part of $Lehi_1$'s original prophetic words or added by $Nephi_1$ as he composed this phrase that seems to symbolize interim nights of a waxing moon;
4. "many", a referenced general or O number-term, which apparently means a quantity more than one but yet to be specified, and which creates the letter-set implying the "first quarter" or visible half of a waxing moon;
5. "many", another O number-term that is part of the same letter-set;
6. "even eight", another L number-term composed with the specifying adverb *even*, but apparently implying several more interim nights of a waxing moon;
7. "these many", a referenced cardinal or N number-term that contains the determiner *these* and creates the letter-set implying a full moon;
8. "these many", another N number-term that is part of the same letter-set;
9. "six hundred", a third L number-term apparently symbolizing interim nights of a waning moon; and
10. "many", a third O number-term implying the "third quarter" or visible half of a waning moon.

At the beginning of $Nephi_1$'s second major division (Second Nephi or 2 Nephi), the following two L number-terms and another M number-term occur. These three number-terms apparently represent the concluding interim nights and last visible crescent of a synodic month. Between the eighth and ninth express number-terms listed above, the temporal-expression "in years" occurs without a number-term. For analytical purposes, this expression initially was categorized with an

[29] See Division 2, Part 2, Sections 2.2.4-2.2.6.

absent or P number-term.[30] In the proposed symbolism of a synodic month, this analytical type of number-term was disregarded. Hence, in Tables 1.H and 2.A of this Division, the absent number-term is designated only with a tilde ~ rather than with a capital letter. Unlike all the express number-terms, an absent number-term, by itself, cannot provide any quantification.

3.2.1 The one-year interval

The number-terms "the first" and "that same" both quantify a year in the reign of king Zedekiah when "there came many prophets prophesying unto the people that they must repent or the great city Jerusalem must be destroyed". In this year, $Lehi_1$ received his prophetic calling and set about declaring the visionary "things which he had both seen and heard".[31] The interval in which these events occurred was a regnal year in the chronological system of the kingdom of Judah. Immediately before the enthronement of Zedekiah, the kingdom had been forced to surrender the "great city" and thousands of its leading citizens to their Babylonian oppressors. The exile of these political elites and many of their servants, advisors, and protectors to Babylon began as Mattaniah accepted the throne from Nebuchadrezzar and took the throne name Zedekiah.[32] The year may have consisted of 12 or 13 synodic months, depending on whether a synodic month was added to the year under the seasonal and political conditions at the time.[33] Assuming the length of a mean synodic month, the year would have been about 354.367 days (for 12 months) or about 383.898 days (for 13 months).

3.2.2 The 600-year interval

The stated cardinal or L number-terms "even six hundred" and "six hundred" are the first two of three number-terms that use "six hundred" in the small plates of Nephi. The phrase "six hundred" as a number-term apparently originated in a prophecy delivered to, and recorded by, $Nephi_1$'s father $Lehi_1$.[34] Based on the length of a mean synodic month, 600 12-month years or 7200 synodic months would be about 212620.234 days. The interval of 7200 months also may be sorted as 400 18-month years. An interval of 212621 days may suggest a near accord with the length of 2417 mean sidereal periods of Mercury (about 212622.016 days). The difference in the two mean astronomical intervals is about 1.78 days. Based on the length of 600 tropical years (219145.314 days), the followers of $Lehi_1$ may have expected to measure 7421 synodic months (about 219146.508 days). An interval of 219147 days suggests close accords with 8021 mean sidereal months (about 219147.035 days) and 617 years composed of 13 sidereal months each ($13 \times 617 = 8021$).

3.2.3 The eight-year interval

The other stated cardinal number-term in First Nephi, "even eight", specifies an interval that had been observed and numbered by $Lehi_1$ and his followers in the wilderness. In the proposed

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[30] See Division 1, Part 4, Section 4.7.

[31] 1 Nephi 1:4-18.

[32] See Division 10, "Jehoiakim Was Not Nephi's Zedekiah".

[33] See Division 2, Part 2, Section 2.3.3. The timing of intercalation in Judah need not have been identical to the timing of intercalation in Babylonia or Egypt.

[34] 1 Nephi 10:1-4.

12-month Lehi era calendar that they may have used, eight years or 96 mean synodic months would be about 2834.937 days. Nephi$_1$, writing the phrase "even eight" in a New World context, may have been aware that 2835 days were the equivalent of 405 7-day weeks and 315 9-day cycles.

3.2.4 The calculated interval

The only other number-terms in First Nephi that may suggest a definite number of years are the two phrases "these many" that Nephi$_1$ seems to have composed for his quotation of his elder brothers' opposition to his proposal that they should help him build a ship. These referenced cardinal or N number-terms are the first two of seven such number-terms in the small plates. Three were added by Jacob$_2$, one was composed by his son Enos, and the final N number-term was added by Mormon$_2$ to complete the (NLN) number-term letter-group begun by Jacob$_2$.

As discussed in Part 4 of Division 1, where number-terms were introduced, the determiner *these* and the adjective *many* may not refer to the cardinal number that appears in the immediately previous stated cardinal number-term, "even eight".[35] That number-term quantified the years Lehi$_1$ and his followers spent in the wilderness before reaching the seashore they called Bountiful.[36] After they reached Bountiful, perhaps early in the ninth Lehi calendar year, Nephi$_1$ says that a "space of many days" occurred before he envisioned the building of a ship.[37] Another interval occurred while Nephi$_1$ acquired iron ore from the location the Lord revealed to him and then "did make bellowses wherewith to blow the fire". The plural "bellowses"[38] indicates that Nephi$_1$ made more than one bellows during what likely was another "space of many days" as he attempted to create a bellows that worked well enough for him to "make tools of the ore which [he] did molten out of the rock".[39] His elder brothers mocked his efforts by saying, "Our brother is a fool, for he thinketh that he can build a ship. Yea, and he also thinketh that he can cross these great waters." When the tools were created and Nephi$_1$ sought their assistance, his brothers "did complain against [him] and were desirous that they might not labor, for they did not believe that [he] could build a ship, neither would they believe that [he] were instructed of the Lord".[40] The confrontation became heated and eventually threatened Nephi$_1$'s life.[41] However, as part of the initial heated exchanges, his elder brothers complained that Nephi$_1$ was "like unto our father, led away by the foolish imaginations of his heart. Yea, he hath led us out of the land of Jerusalem, and we have wandered in the wilderness for *these many* years…. Behold, *these many* years we have suffered in the wilderness".[42]

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[35] See Division 1, Part 4, Section 4.6.3.

[36] 1 Nephi 17:4.

[37] 1 Nephi 17:7-10.

[38] "[I]n Early Modern English, *bellowses* was not viewed as nonstandard, although by Joseph Smith's time it was. The [*Oxford English Dictionary*] also points out that *gallows* has developed in the same way as *bellows*, with examples of *gallowses* and *a gallows*." Skousen with Carmack, *The History of the Text of the Book of Mormon, Part One*, 268-69; *The Compact Edition of the Oxford English Dictionary*, I: 197 (bellows); 1109 (gallows).

[39] 1 Nephi 17:11-16.

[40] 1 Nephi 17:17-18.

[41] 1 Nephi 17:7-52.

[42] 1 Nephi 17:20-21, number-terms italicized.

A key aspect of $Nephi_1$'s confrontation narrative is that he appears to quote himself and his elder brothers. Nonetheless, he composed this part of the small plates at least two decades after the event[43] and he apparently had several structural reasons to create QBHN and RBHN temporal-expressions, one after the other, in this part of his writings.[44] Thus, when $Nephi_1$'s elder brothers are said to complain about wandering and suffering in the wilderness (including their time in Bountiful), they do so with a duplicated BHN year-related expression, "these many years". Most likely, these words are ones $Nephi_1$ chose for creating his chronological structure, while at the same time expressing his elder brothers' emotions about wandering and languishing far from their once bountiful circumstances in the kingdom of Judah. Perhaps their separation from Jerusalem had lasted for as much as a decade and, as yet, they had heard no reliable information that the city had been destroyed.[45] Indeed, even if it had been destroyed, they seem to have believed they still could return to, and prosper in, "the land of [their] inheritance".[46] But $Nephi_1$, with his tools and revelation to build a ship, and $Lehi_1$, who still governed them all, were convinced to go elsewhere to a "land of promise".[47]

$Nephi_1$'s repeated number-terms, "these many", possibly could refer just to the eight years that $Nephi_1$ says had passed when the desert travelers reached the land they called Bountiful.[48] As references to a previously stated number-term, the use of "these many" would correspond to the use of the referenced ordinal number-term, "that same", earlier in $Nephi_1$'s writings.[49] This interpretation suggests that all of $Nephi_1$'s activities prior to the bitter confrontation with his elder brothers occurred relatively early in the ninth year after $Lehi_1$ left Jerusalem.

$Nephi_1$ and his brothers clearly differed in their attitudes toward Bountiful. $Nephi_1$'s vision about the ship they were to build and his haste to create tools indicate his belief that the bounties and experiences available in the plentiful land of Bountiful would enable them to reach their land of promise. His elder brothers saw all this as foolishness. Anywhere but "the land of Jerusalem" was wilderness to them. They wanted to be home enjoying their "possessions" and "the land of [their] inheritance".[50] For $Nephi_1$'s elder brothers, not only the eight years spent wandering in the wilderness before they reached Bountiful, but every other moment they languished at the seashore made up "these many years". The phrase "these many years", as $Nephi_1$'s expression of their emotions, likely meant eight years plus many days that passed as his elder brothers heard about the ship they would be building in Bountiful and watched $Nephi_1$'s metal working activities. This interpretation suggests that most of nine years had passed away before this first defining confrontation about building the ship occurred between the brothers.

As a third possibility, "these many years" may have referred to an entire decade. $Nephi_1$'s elder brothers seem to have been particularly scornful of their younger brother's revelation and adamantly uncooperative when he had the audacity to propose that his revelation should govern them and that they should labor to build a ship for a voyage of unknown length to an unfamiliar

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[43] 2 Nephi 5:28-32.

[44] See Division 2, Part 1, Sections 1.4-1.7; Part 2, Table 2.A.

[45] 1 Nephi 17:43.

[46] 1 Nephi 17:21.

[47] Compare 1 Nephi 2:8-14; 5:1-7.

[48] 1 Nephi 17:4-5.

[49] 1 Nephi 1:4.

[50] 1 Nephi 17:20-21.

land. Their intransigence, including their apparent willingness to kill him, suggests that this confrontation had been brewing for a period perhaps ranging well into the tenth year since $Lehi_1$ left Jerusalem. Thus, the cardinal numbers 8, 9, and 10 could be proposed as alternatives for the referenced quantity implied by the dual "these many" phrases.

Nevertheless, nothing in the confrontation narrative or in the duplicated expressions, "these many years", requires the additional assumption that 8, 9, and 10 must be understood as mutually exclusive alternatives. $Nephi_1$ created the year-related expression "these many years" and he duplicated it for his purposes. Some sort of reference back to a stated number-term is suggested by his other uses of referenced ordinal number-terms. Some sort of computation of time beyond eight years is suggested by his statement about the passing of a "space of many days" before he received the revelation to build a ship. Creating at least two bellows and enough tools for a construction crew required a significant amount of labor and time. Then, during the white hot argument, when $Nephi_1$'s life again was threatened by his elder brothers, "their" phrase "these many years" surely could have meant "eight, nine, and now even ten years!" of suffering under the utterly foolish leadership of $Lehi_1$ and $Nephi_1$.[51] Thus, $Nephi_1$'s uncertain quantification, "these many", may have been intended to refer not just to eight years, or nine years, or even ten years, but to eight, nine, and ten years taken together and emphasized in disgust and frustration by his elder brothers.

The length of a proposed eight-year interval has been noted above. Based on an assumed 12-month Lehi era calendar, nine years or 108 mean synodic months would be about 3189.304 days. Periods of 3189 or 3190 days do not appear to suggest a near or close accord with other astronomical or calendrical periods visible to, or calculable from, naked-eye observation, except for a near accord between 3190 days and the length of eight mean synodic periods of the planet Jupiter (about 3191.074 days). This near accord probably is coincidental. Under the conditions experienced by $Lehi_1$'s followers in the desert, it seems unlikely that they were tracking and recording the synodic periods of Jupiter from the moment they left Jerusalem. Ten Lehi calendar years or 120 mean synodic months, which may not have fully passed away at the time of the brothers' argument, would be about 3543.671 days. Periods of 3543 or 3544 days do not suggest a near or close accord with other chronological intervals visible to, or calculable from, unaided observation (Table 3.A).

3.2.5 Potential combinations

The stated number-terms in First Nephi include one stated ordinal or K number-term and three stated cardinal or L number-terms. The number-terms in First Nephi also include a single referenced ordinal or M number-term, "that same", which references the immediately preceding K number-term, "the first". Given the position and diction of "that same", it may be possible to consider this number-term to be as definite a number as the previous stated number, "the first". Moreover, First Nephi contains two referenced cardinal or N number-terms that are identical to each other in diction and imply referenced values that are the same (having to do with the same interval of time), and, therefore, require consistent interpretation. Lastly, First Nephi contains four temporal-expressions that state no definite quantification of years: three with referenced

[51] 1 Nephi 17:16-22, 48-52.

general or O number-terms, each just “many”, and one categorized as an absent or P number-term, or as a disregarded or ~ number-term.

Thus, First Nephi provides four stated number names that may be examined by themselves and by adding them into 11 possible combinations of two or more number names for a total of 15 definite numbers to be examined (either stated numbers or combination sums). This process assumes that the number name expressed in a number-term is not used twice in a single combination. In addition, a single number name referenced by the M number-term and two number names referenced by the N number-terms may be considered to create more combinations. The complicating factor in creating and analyzing all these combinations is that two of the L number-terms (each 600), the two N number-terms (each identical and, if they represent numbers, both either 8, 9, or 10), and the K and M number-terms (the first a 1 and, if the second represents a number, then another 1) create hundreds of seemingly duplicate combinations and combinations sums. Nonetheless, each 600 in a combination may come from a different number-term, each 8, 9, or 10 may come from a different number-term, and each 1 may do the same. Each of the different combinations of number-terms is unique, even though the number names being combined may have the same cardinal or ordinal values.

As noted above, the four stated number-terms by themselves and in combination with each other create 15 definite numbers to be examined. Then, if “that same” ($Nephi_1$’s M number-term or perhaps $Lehi_1$’s M number-term quoted by $Nephi_1$) were deemed to represent “the first” (represented in the combinations by the cardinal number 1), so that five definite numbers were being combined, that M number 1 by itself and an additional 15 possible combinations would occur (for a total of 31 numbers to be examined). Further, if $Nephi_1$’s first N number-term were deemed to represent eight years, that N number 8 by itself and an additional 15 possible combinations would occur (for a total of 47 numbers to be examined). Alternatively, if his first N number-term were deemed to represent nine or ten years, those N numbers 9 and 10 by themselves and an additional 15 possible combinations associated with each number would occur (for a total of 79 numbers to be examined). This same process may be reiterated for $Nephi_1$’s second N number-term and its three alternative referenced numbers (also 8, 9, or 10), and for combinations of the M number-term with the alternative referenced numbers of the first N number-term, and then with those of the second N number-term, and finally with the referenced numbers of both N number-terms taken together. If an M or N number-term is deemed to have no definite value, it is not represented by a zero (0) in the combinations. Rather, it is disregarded because it is quantitatively indefinite, which is not the same as the value zero (0). All these combinatory sequences (taking the proposed values one at a time up to seven at a time) result in a total of 319 unique combinations of number-terms to be examined [15+ (19x16) = 319].

Because of duplication in the underlying proposed numbers, the 319 possible combinations produce just 65 unique numbers (some proposed values of the number-terms themselves, plus many combination sums). The other 254 proposed values and combination sums are duplicates. The values of the 65 unique numbers range from 1 to 1230; however, because of the large value (600) of two stated number-terms, the range of combination sums is divided into three segments: 1-30, 600-630, and 1200-1230. In the 1-30 range, there are 21 unique values. In the 600-630 range, there are 22 unique values and, in the 1200-1230 range, there are also 22 unique values.

Is there any evidence in the writings of $Nephi_1$ to indicate that he intended the seven K, L, M, and N number-terms in First Nephi to be combined into any of the 319 combinations? The answer appears to be “yes”. Nevertheless, it must be emphasized again that this answer is neither derived from, nor dependent on, near or close accords with other chronological intervals. Of the

65 unique numbers, 40 (61.5%) imply near or close accords with astronomical intervals listed in Table 3.A. Thirty of the unique numbers (46.2%) also suggest close accords with the five most basic day cycles listed in Table 3.A (7-day, 9-day, 13-day, 20-day, and 30-day). The answer "yes" is not derived from these lists of near and close accords. Instead, this answer is derived from the text of $Nephi_1$'s writings.

Specifically, the answer "yes" is derived from the diction, language typology, and placement of number-terms and their accompanying year- and time-terms, and narrative-links, within the context of their associated narratives. Those express aspects of $Nephi_1$'s writings create the Sets proposed in this Part. Then the combinations of the numbers in those Sets by addition produce Set-sums. The assumption that a Set-sum represents a certain number of days creates a temporal interval, which then may suggest one or more Set-contexts (near or close commensurations with other temporal intervals). All these intervals, in turn, imply aspects of Nephite chronological culture that appear to attest to the accuracy of the Nephite measurement of $Lehi_1$'s 600-year prophecy. Thus, while one purpose of $Nephi_1$'s time-terms appears to have been the express identification of the Lehi era context, a parallel purpose of his number-terms appears to have been the accurate measurement of the length of that era context. $Nephi_1$'s witness to that accuracy during his lifetime appears to be one of the primary implications of his Sets, Set-sums, and Set-contexts.

Of the 319 possible combinations and 65 unique numbers, 13 combinations (4.1%) and 25 unique numbers (38.5%) are proposed as the text-based Sets and Set-sums that suggest $Nephi_1$'s intention to symbolize Nephite chronological culture through his creation of year-related expressions and their narrative-links. The other 306 combinations (95.9%) and 40 unique numbers (61.5%) are deemed to be incidental or ancillary to the proposed purposes of $Nephi_1$'s number-terms. The 13 proposed Sets and their 25 Set-sums must be examined in detail. This examination of Sets begins with a Set defined primarily by the difference in year-terms.

3.2.6 The Set with Set-contexts of 1224, 1226, or 1228 days

Set definition. The first proposed Set in First Nephi uses two clear textual distinctions for its definition. As to year-terms (the nouns where the analysis begins), the distinction is between express singular or A year-terms and express plural or B year-terms. This distinction sorts the number-terms into two categories: the stated and referenced ordinal number-terms (K and M), which are associated with A year-terms, and the stated and referenced cardinal number-terms (L and N), which are associated with B year-terms.

This proposed Set is composed of the L number-terms, which provide the stated numbers 600, 8, and 600, and the N number-terms, which each contribute the alternative number 8, 9, or 10. The five cardinal number-terms included in this Set produce three alternative Set-sums. By contrast, the ordinal number-terms, by themselves and as a combination, suggest the numbers 1, 1, and 2. These numbers are deemed to be incidental or ancillary to the intended Set because every other number and combination sum is divisible by 1 and every even number and even combination sum is divisible by 2.

Set and Set-sum illustration. This Set of number-terms and its alternative values for the N number-terms may be depicted by the equation □ + □ +600+8+8+8+600 = 1224, the equation □ + □ +600+8+9+9+600 = 1226, and the equation □ + □ +600+8+10+10+600 = 1228. The empty boxes represent the K and M number-terms that modify the A year-terms in First Nephi. The three referenced general or O number-terms are not represented by empty boxes in this Set or

any of the proposed Sets because O number-terms appear to provide intentionally and consistently indefinite quantification. The single absent (P or ~) number-term also is not represented by an empty box in any of the proposed Sets because it has no potential for providing any quantification. Thus, seven number-terms are represented either by a definite number or by an empty box in this Set and in each of the other 12 proposed Sets. The Set-sum 1224 is not duplicated by any of the other 318 possible combinations. The Set-sums 1226 and 1228 are duplicated by the two combinations discussed below in Section 3.2.15.

Set-contexts. The Set-sum 1224 suggests three Set-contexts: close accords with the lengths of 136 9-day cycles (9x136 = 1224) and 45 mean draconic months (about 1224.55 days) and a near accord with the length of 41.5 mean synodic months (about 1225.519 days). The Set-sum 1226 implies two Set-contexts: a close accord with the length of 41.5 mean synodic months and a near accord with the length of 45 mean draconic months. The Set-sum 1228 suggests two potential Set-contexts: a close accord with 1.5 819-day cycles (1228.5 days) and a near accord with the length of 45 mean sidereal months (about 1229.475 days).

3.2.7 The Set with a Set-context of 1201 days

Set definition. This proposed Set, unlike the preceding Set, is composed by sorting number-terms in relation to their time-terms. Three of the stated K and L number-terms occur in year-related expressions with personalized or G time-terms. These time-terms are integral parts of the (GHGHG) time-term letter-group in First Nephi.

Set and Set-sum illustration. This Set may be symbolized by the equation 1+ □ +600+ □ + □ + □ +600 = 1201. The four empty boxes represent the referenced ordinal or M number-term, one of the stated cardinal or L number-terms, and both referenced cardinal or N number-terms, all of which occur in year-related expressions characterized by omitted or H time-terms. These four empty box expressions also are integral to the (GHGHG) letter-group in First Nephi. The Set-sum 1201 is duplicated by one of the other 318 combinations.

Set-context. A single Set-context is suggested by the Set-sum 1201: a near accord with the length of 44 mean sidereal months (about 1202.153 days).

3.2.8 The Set with Set-contexts of 25, 27, or 29 days

Set definition. The third proposed Set of First Nephi is composed of all the number-terms associated with omitted or H time-terms. This Set is the time-term complement of the second proposed Set. The recognition of omitted time-terms as an intentional type is integral to identifying the three (GHGHG) time-term letter-groups that appear in the small plates of Nephi. Nevertheless, because the time-terms are omitted, the chronological systems in which these years existed must be implied from the associated narratives and number-terms. In this proposed Set, a single stated cardinal or L number-term is combined with the referenced M and N number-terms.

Set and Set-sum illustration. This proposed Set and its alternative Set-sums may be depicted by the equation □ +1+ □ +8+8+8+ □ = 25, the equation □ +1+ □ +8+9+9+ □ = 27, and the equation □ +1+ □ +8+10+10+ □ = 29. The empty boxes represent number-terms associated with the personalized or G time-terms in First Nephi. The M number-term, “that same”, is represented by the definite number 1. The L number-term, “even eight”, is represented by the number 8. The N number-terms, “these many”, are represented by the numbers 8 and 8, 9 and 9, or 10 and 10. The number 1 is related to the first H letter-set in the (GHGHG) time-term letter-group of First

Nephi. The group of three consecutive numbers is related to the second H letter-set of this letter-group. The proposed Set-sums 25, 27, and 29 are each duplicated by another combination.

Set-contexts. The Set-sum 25, by itself, does not imply a near or close accord with any interval listed in Table 3.A. However, 25 days may suggest an observable interval from first to last visible crescents in a synodic month. This is not a near accord with the full length of a synodic month because the difference is about 4.53 days. But this is an observable and measureable portion of a synodic month and it may be considered a shorter near accord with the length of the crescent-to-crescent interval. Consistent, but unaided observations might usually measure the crescent-to-crescent interval as 26 or 27 days (the close accords), and 28 days likely would be considered a longer near accord, a measurement observed from an advantageous viewpoint. A period of 25 days would be a short measurement of the crescent-to-crescent interval. Similarly, a period of 25 days may be considered an observable and measureable part of a single mean sidereal period of Venus (about 224.701 days). Nine 25-day periods (25x9 = 225) represents a close accord with the Venus sidereal period. Thus, the Set-sum 25 suggests two Set-contexts, one associated with the synodic month and the other with the Venus sidereal period.

Five Set-contexts are suggested by the Set-sum 27: close accords with the lengths of 3 9-day cycles (9x3 = 27), one mean draconic month (about 27.21222 days), one mean sidereal month (about 27.32166 days), a crescent-to-crescent period of one synodic month, and an observable part (27x14 = 378) of a single mean synodic period of Saturn (about 378.092 days) . The Set-sum 29 implies near accords with the lengths of a mean draconic month and a mean sidereal month and close accords with the lengths of a single mean synodic month (about 29.53059 days) and an observable and measureable part (29x4 = 116) of one mean synodic period of Mercury (about 115.878 days).

3.2.9 The Set with a Set-context of 601 days

Set definition. Narrative-links also may suggest ways to sort number-terms. The fourth proposed Set is composed of the two stated number-terms (K and L) that are associated with prepositional or Q narrative-links in First Nephi. These are the first and last stated number-terms in $Nephi_1$'s initial book. The other stated number-terms (both L) are associated with adverbial or U narrative-links and they are excluded from this Set.

Set and Set-sum illustration. This Set and Set-sum may be symbolized by the equation 1+ □ + □ + □ + □ + □ +600 = 601. The five empty boxes represent the referenced ordinal or M number-term, both referenced cardinal or N number-terms, and the two stated cardinal or L number-terms that are accompanied by U narrative-links. The Set-sum 601 is duplicated by three other combinations.

Set-context. The Set-sum 601 suggests a single Set-context: a close accord with the length of 22 mean sidereal months (about 601.077 days).

3.2.10 The Set with Set-contexts of 625, 627, or 629 days

Set definition. This fifth proposed Set is composed of every number-term between the first and last number-terms (the stated number-terms associated with prepositional or Q narrative-links discussed in Section 3.2.9). These are the referenced number-terms accompanied by a Q narrative-link and the stated number-terms accompanied by a U narrative-link. That is, between

the number-terms that produce the Set-sum 601, the complementary number-terms produce this fifth Set.

Set and Set-sum illustration. This Set and its alternate Set-sums may be symbolized by the equation □ +1+600+8+8+8+ □ = 625, the equation □ +1+600+8+9+9+ □ = 627, and the equation □ +1+600+8+10+10+ □ = 629. The empty boxes represent the stated ordinal or K number-term that begins First Nephi and the stated cardinal or L number-term that ends First Nephi. The Set-sums 625, 627, and 629 are each duplicated by three other combination sums.

Set-contexts. A single Set-context is suggested by the Set-sum 625: a close accord with the length of 23 mean draconic months (about 625.881 days). The Set-sum 627 implies two Set-contexts: near accords with the intervals of 23 mean draconic months and 23 mean sidereal months (about 628.398 days). The Set-sum 629 suggests a close accord with the length of 23 mean sidereal months.

3.2.11 The Set with Set-contexts of 602 days

Set definition. The sixth proposed Set sorts number-terms, in part, on the basis of narrative-links. This Set also assumes that the referenced ordinal or M number-term is treated like a stated ordinal number. The quantitative meaning of "that same" is unequivocally "the first" and, thus, its meaning is as definite as the stated number-term that it immediately follows. This Set is composed of all three number-terms that supply definite numbers and are associated with prepositional or Q narrative-links.

Set and Set-sum illustration. The Set and Set-sum may be represented by the equation 1+1+ □ + □ + □ + □ +600 = 602. The empty boxes represent the referenced cardinal or N number-terms (which suggest alternative values) and the two stated cardinal or L number-terms that are associated with adverbial or U narrative-links. The Set-sum 602 is duplicated by one other combination sum.

Set-context. The Set-sum 602 implies two Set-contexts: close accords with the lengths of 86 7-day weeks (7x86 = 602) and 22 mean sidereal months (about 601.077 days).

3.2.12 The Set with Set-contexts of 624, 626, or 628 days

Set definition. The seventh proposed Set is composed of every number-term between the three definite number-terms that are associated with the prepositional or Q narrative-links discussed in Section 3.2.11. In other words, between the number-terms that produce the sixth proposed Set, the complementary number-terms produce this seventh Set.

Set and Set-sum illustration. This Set and its alternate Set-sums may be symbolized by the equation □ + □ +600+8+8+8+ □ = 624, the equation □ + □ +600+8+9+9+ □ = 626, and the equation □ + □ +600+8+10+10+ □ = 628. The empty boxes represent the stated and referenced ordinal number-terms (K and M) at the beginning of First Nephi and the stated cardinal or L number-term that ends First Nephi. The Set-sum 624 is duplicated by one other combination sum and the Set-sums 626 and 628 are each duplicated by three other combination sums.

Set-contexts. The Set-sum 624 implies two Set-contexts: a close accord with 48 13-day cycles (13x48 = 624) and a near accord with the interval of 23 mean draconic months (about 625.881 days). A single Set-context is suggested by the Set-sum 626: a close accord with the length of 23 mean draconic months. The Set-sum 628 implies a close accord with the length of 23 mean sidereal months (about 628.398 days).

3.2.13 The Set with Set-contexts of 1209 days

Set definition. $Nephi_1$'s choices with regard to the diction of his stated and referenced number-terms in First Nephi are not in doubt. He clearly separated the number-terms into two groups, one of which (the stated number-terms) always provides definite quantification. His referenced number-terms do not completely and unequivocally state number names and, thus, they may or may not imply definite quantification. The eighth proposed Set in this major division is composed of the four definite number names in the stated number-terms of this book. In this Set, all referenced number-terms are treated as being quantitatively indefinite.

Set and Set-sum illustration. This Set and Set-sum may be depicted by the equation 1+ □ +600+8+ □ + □ +600 = 1209. The empty boxes represent the referenced ordinal or M and referenced cardinal or N number-terms. The stated ordinal or K number-term provides the number 1 to the equation. The stated cardinal or L number-terms provide the other three numbers. The Set-sum 1209 is duplicated by seven other combinations.

Set-contexts. The Set-sum 1209 suggests three Set-contexts: a close accord with the length of 93 13-day cycles (13x93 = 1209) and near accords with the lengths of 44.5 mean draconic months (about 1210.944 days) and 41 mean synodic months (about 1210.754 days).

3.2.14 The Set with Set-contexts of 1210 days

Set-definition. The ninth proposed Set combines the referenced ordinal or M number-term, "that same", with the four stated or K and L number-terms. As noted above, there is no question what the quantitative meaning of "that same" was intended to be and, thus, the meaning of this number-term is as definite as that of the stated number-terms in First Nephi. Moreover, the referenced cardinal or N number-terms may represent alternative numbers; so, they are distinguishable and may be treated differently from the referenced ordinal or M number-term.

Set and Set-sum illustration. This proposed Set and Set-sum may be symbolized by the equation 1+1+600+8+ □ + □ +600 = 1210. The empty boxes represent the referenced cardinal or N number-terms and their indefinite quantification. The Set-sum 1210 is duplicated by eight other combination sums.

Set-contexts. The Set-sum 1210 implies close accords with the lengths of 44.5 mean draconic months (about 1210.944 days) and 41 mean synodic months (about 1210.754 days).

3.2.15 The Set with Set-contexts of 1225, 1227, or 1229 days

Set-definition. The tenth proposed Set includes all the stated and referenced number-terms, except for the initial stated ordinal or K number-term. There are multiple L, M, and N number-terms in $Nephi_1$'s writings, but the K number-term at the beginning of First Nephi is unique in the small plates. This differentiation of the number-terms chosen and placed by $Nephi_1$ is the textual basis for this tenth Set.

Set and Set-sum illustration. The three proposed equations for this Set appear to depict interim steps between the proposed Set and Set-sums of Section 3.2.6 and the overlapping proposed Set and Set-sums of Section 3.2.16. The combinations for this Set may be depicted by the equation □ +1+600+8+8+8+600 = 1225, the equation □ +1+600+8+9+9+600 = 1227, and the equation □ +1+600+8+10+10+600 = 1229. In these three equations, the empty boxes represent

the unique K number-term. The alternative Set-sums 1225, 1227, and 1229 each is duplicated by one other combination.

Set-contexts. The Set-sum 1225 suggests three Set-contexts: close accords with the lengths of 175 7-day weeks (7x175 = 1225), 41.5 mean synodic months (about 1225.519 days), and 45 mean draconic months (about 1224.55 days). The Set-sum 1227 implies a near accord with the length of 41.5 mean synodic months. The Set-sum 1229 suggests two potential close accords with the lengths of 45 mean sidereal months (about 1229.475 days) and 1.5 819-day cycles (1228.5 days).

3.2.16 The Set with Set-contexts of 1226, 1228, or 1230 days

Set-definition. The 11th proposed Set in First Nephi may be represented by an equation that has no empty boxes. Like the three previous proposed Sets, with their sorting focused on differences in number-term diction and type, this Set also recognizes the different nature of the quantification expressed in referenced ordinal and referenced cardinal number-terms. In this instance, all three referenced number-terms are deemed to contribute definite numbers to the Set. The M number-term contributes the definite number 1. Each N number-term contributes alternative numbers 8, 9, or 10.

Set and Set-sum illustration. This Set of number-terms and its alternative values for the N number-terms produce three different Set-sums, as represented by the equation 1+1+600+8+8+ 8+600 = 1226, the equation 1+1+600+8+9+9+600 = 1228, and the equation 1+1+600+8+10+ 10+600 = 1230. The Set-sums 1226 and 1228 are each duplicated by one other combination (discussed in Section 3.2.6 above). The Set-sum 1230, like the Set-sum 1224 discussed in Section 3.2.6, is unique in the 319 possible combinations.

Set-contexts. The Set-contexts suggested by the Set-sums 1226 and 1228 are detailed in Section 3.2.6 above. The Set-sum 1230 implies three Set-contexts: close accords with the lengths of 41 30-day cycles (30x41 = 1230) and 45 mean sidereal months (about 1229.475 days), and a near accord with the length of 14 mean sidereal periods of Mercury (about 1231.571 days).

3.2.17 The Set with Set-contexts of 1200 days

Set definition. The 12th proposed Set sorts number-terms primarily based on the diction of two time-terms. Two stated cardinal or L number-terms occur in narratives about $Lehi_1$'s 600-year prophecy. Their personalized or G time-terms describe years "from the time that my father left Jerusalem" or "from the time my father left Jerusalem". When $Lehi_1$'s ministry at Jerusalem came to an end, these 600 years were all future years. These two L number-terms are the first and last L number-terms in First Nephi, and the only ones included in this Set.

Set and Set-sum illustration. This Set and Set-sum may be symbolized by the equation □ + □ + 600+ □ + □ + □ +600 = 1200. The five empty boxes represent the stated and referenced ordinal or K and M number-terms, the second stated cardinal or L number-term that is accompanied by a U narrative-link, and both referenced cardinal or N number-terms. The Set-sum 1200 is not duplicated by another combination.

Set-contexts The Set-sum 1200 suggests two Set-contexts: close accords with the lengths of 60 20-day cycles (20x60 = 1200) and 40 30-day cycles (30x40 = 1200). In addition, the Set-sum 1200 suggests a calendrical statement that is discussed in Section 3.2.20 below.

3.2.18 The Set with Set-contexts of 26, 28, or 30 days

Set definition. In contrast with the 12th Set, this 13th proposed Set includes the stated ordinal or K number-term and the referenced ordinal or M number-term that identify the first year of king Zedekiah, the year when $Lehi_1$'s prophetic ministry began at Jerusalem, a year that had existed and that he and his family had experienced. Between the future year number-terms (600), the other L number-term ("even eight") and the two referenced cardinal or N number-terms (both "these many") also identify years that had existed and were lived by $Lehi_1$, his family, and his followers in the wilderness. Thus, this proposed Set includes complementary number-terms associated with years that were experienced rather than expected.

Set and Set-sum illustration. This Set and its three alternative Set-sums may be depicted by the equation 1+1+ □ +8+8+8+ □ = 26, the equation 1+1+ □ +8+9+9+ □ = 28, and the equation 1+1+ □ +8+10+10+ □ = 30. The empty boxes represent number-terms (each 600) associated with the two prophetic time-terms. The K and M number-terms are each represented by the number 1. The L number-term, "even eight", is represented by the number 8. The N number-terms, "these many", are represented by the numbers 8 and 8, 9 and 9, or 10 and 10. The proposed Set-sums 26 and 28 are duplicated by one other combination each, but the Set-sum 30 is unique in the 319 possible combinations.

Set-contexts. The Set-sum 26 implies five Set-contexts: near accords with the intervals of a mean draconic month (about 27.21222 days) and a mean sidereal month (about 27.32166 days) and close accords with 2 complete 13-day cycles (13x2 = 26), a crescent-to-crescent period of one synodic month, and an observable part (26x30 = 780) of a single mean synodic period of Mars (about 779.937 days). The Set-sum 28 suggests close accords with the lengths of 4 complete 7-day weeks (7x4 = 28), a mean draconic month, a mean sidereal month, and an observable part (28x13 = 364) of a computing year of 364 days. It also implies near accords with a crescent-to-crescent period of a synodic month and with the entire length of a mean synodic month (about 29.53059 days). The Set-sum 30 suggests close accords with the 30-day cycle listed in Table 3.A, a mean synodic month, and an observable part (30x26 = 780) of a mean synodic period of Mars.

3.2.19 Lunar symbolism of the First Nephi number-terms

The above listed Sets, Set-sums, and Set-contexts are implied by the text of First Nephi. The seven quantified or quantifiable K, L, M, and N number-terms, the 13 Sets created by a text-based sorting of those number-terms, and the 25 possible Set-sums combine to suggest Nephite attention to three distinct kinds of lunar periods observable with unaided eyes. These lunar Set-contexts appear to depict relatively precise ways to distinguish, track, measure, and predict the lengths of draconic, sidereal, and synodic months in terms of whole natural days counted over a variety of intervals. The temporal-expressions of First Nephi (as understood primarily in terms of their number-terms) appear to symbolize a lunar discussion that is organized by the three combination sum ranges (1-30, 600-630, and 1200-1230).

Table 3.C lists the 25 Set-sums that appear in these three ranges, together with an organized presentation of the Set-contexts identified above and their lunar implications. Visible and invisible intervals related to synodic months begin and end the period of 25 through 30 days. Within that six-day interval, the overlapping nature of the three lunar months is implied. The full length of a synodic month is depicted as longer than (or enclosing) the lengths of the two other

kinds of lunar months. The following list compares the "Set-context" means implied by alternating periods of whole natural days (the close accords) with the modern estimates of these means (expressed with fractional days).

Month type	Close accords	Implied mean	Modern mean	Difference
synodic	29 or 30 days	29.5 days	29.53059 days	44.0 minutes
sidereal	27 or 28 days	27.5 days	27.32166 days	256.8 minutes
draconic	27 or 28 days	27.5 days	27.21222 days	414.4 minutes

As Table 3.C also shows, sidereal month measurements begin and end the Set-contexts suggested within the 600-630 range of combination sums. None of these eight Set-sums suggests a near or close accord with a synodic month interval. When compared with the suggested days in the 1-30 range, the length of a sidereal month in this range appears to be depicted as longer than (or enclosing) the length of a draconic month. The longer group of 624-629 days depicts a temporal separation between 23 draconic months and 23 sidereal months. The following list compares the "Set-context" means implied by alternating periods of whole natural days (the close accords) with the modern estimates of these means (expressed with fractional days).

Month type	Close accords	Implied mean	Modern mean	Difference
sidereal	628 or 629 days	27.32609 days	27.32166 days	6.4 minutes
draconic	625 or 626 days	27.19565 days	27.21222 days	23.9 minutes

After their respective periods of 23 months, these two kinds of months appear to have an implied mean difference of about 30.3 minutes. These implied means (based on alternating counts of close accords) are more precise than those suggested by the close accords of single months.

In the 1200-1230 range of combination sums depicted in Table 3.C, an implied measurement of synodic months again is represented. The Set-context intervals implied in this range depict the separation of the lengths of the three kinds of lunar months. They also depict (with the Set-sum 1227) a clear temporal separation of 45 draconic months and 45 sidereal months. The following list compares the "Set-context" means implied by alternating periods of whole natural days (the close accords) with the modern estimates of these means (expressed with fractional days).

Month type	Close accords	Implied mean	Modern mean	Difference
synodic	1210 or 1211 days	29.52439 days	29.53059 days	8.9 minutes
synodic	1225 or 1226 days	29.53012 days	29.53059 days	40.6 seconds
sidereal	1229 or 1230 days	27.32222 days	27.32166 days	48.4 seconds
draconic	1210 or 1211 days	27.20225 days	27.21222 days	14.4 minutes
draconic	1224 or 1225 days	27.21111 days	27.21222 days	1.6 minutes

Comparisons of the various implied means represented in the three ranges of combination sums provide additional data to be considered. For synodic months, the implied means and their comparisons with modern estimates are as follows.

Month type	Close accords	Implied mean	Modern mean	Difference
synodic	29 or 30 days	29.5 days	29.53059 days	44.0 minutes
synodic	1210 or 1211 days	29.52439 days	29.53059 days	8.9 minutes
synodic	1225 or 1226 days	29.53012 days	29.53059 days	40.6 seconds

As to sidereal months, the implied means and their comparisons with modern estimates are the following.

Month type	Close accords	Implied mean	Modern mean	Difference
sidereal	27 or 28 days	27.5 days	27.32166 days	256.8 minutes
sidereal	601 or 602 days	27.34091 days	27.32166 days	27.7 minutes
sidereal	628 or 629 days	27.32609 days	27.32166 days	6.4 minutes
sidereal	1202 or 1203 days	27.32955 days	27.32166 days	11.4 minutes
sidereal	1229 or 1230 days	27.32222 days	27.32166 days	48.4 seconds

For draconic months, the implied means and their comparisons with modern estimates are as follows.

Month type	Close accords	Implied mean	Modern mean	Difference
draconic	27 or 28 days	27.5 days	27.21222 days	414.4 minutes
draconic	625 or 626 days	27.19565 days	27.21222 days	23.9 minutes
draconic	1210 or 1211 days	27.20225 days	27.21222 days	14.4 minutes
draconic	1224 or 1225 days	27.21111 days	27.21222 days	1.6 minutes

These comparisons seem to suggest that the larger the number of days associated with a close accord, the more accurate the implied mean length of the month will be. Nonetheless, when sidereal months are measured with 1202 or 1203 days, the implied mean is 11.4 minutes more than the modern estimate, but when sidereal months are measured with 628 or 629 days, the implied mean is just 6.4 minutes more. These data suggest that the observers likely preferred the accuracy of longer measurements of natural days that reached close accords with observed astronomical events, but they probably were also aware that some shorter measurements were the more accurate ones. Presumably, they sought to find the most accurate astronomical accords to improve the precision of their records and predictions.

The precision in observing and recording measurements of draconic, sidereal, and synodic months suggested above, and the apparent care in creating and placing number-terms in First Nephi, hardly seem unplanned. Indeed, all this lunar data suggests a meticulous awareness of the moon's phases and path through the fixed stars. Attention to this level of lunar detail also suggests that the Nephites' observation and recording of the synodic months of the proposed Lehi calendar years were entirely reliable.

To conclude this Section on the lunar symbolism depicted in Table 3.C, the issue should be addressed directly whether the seven Sets that include N number-terms were intended to produce all the Set-sums that result from the use of the numbers 8, 9, *and* 10. This issue was introduced in Section 3.2.4 above. There, the assumption that the number-term phrase, "these many", referred to just one of the specific cardinal numbers (8, 9, *or* 10) was noted to be an unnecessary restriction on the interpretation of the associated narrative. The effect of this assumption on the proposed lunar symbolism may now be considered.

If the N number-terms only reference the previously stated phrase, "even eight", then the seven possible Set-sums are 25 and 26, 624 and 625, 1224, 1225, and 1226. The related lunar Set-contexts would appear to be limited to the shorter crescent-to-crescent periods of synodic months, a new moon/full moon or full moon/new moon interval of synodic months, and near or close accords with draconic months. If the N number-terms reference the previously stated "even eight", plus an additional "space of many days" involving just the ninth year, then the seven Set-sums are 27 and 28, 626 and 627, and 1226, 1227, and 1228. The related lunar Set-contexts would seem to be limited to the longer crescent-to-crescent periods of synodic months and a few near and close accords with intervals of all three kinds of anciently observable lunar months. If

the N number-terms reference just the ten years that may have occurred before $Nephi_1$ was prepared to confront his elder brothers about their refusal to help him build the ship, then the seven Set-sums are 29 and 30, 628 and 629, and 1228, 1229, and 1230. The related lunar Set-contexts would appear to be limited to close accords with single synodic months, and various near and close accords with draconic and sidereal months. In any of these constrictive scenarios, the lunar symbolism depicted in Table 3.C appears to be pointlessly truncated. If the Nephites were carefully observing and measuring synodic, sidereal, and draconic months, why would $Nephi_1$ create an even more partial or jumbled symbolic report of their activities?

The simplicity and clarity of the lunar symbolism set forth in Table 3.C seems to argue for the conclusion that it was all intended. The alternative positions seem to be that no symbolism based on combined number-terms was ever intended or that a snaggle-toothed symbolism that ignored eight years and/or nine years and/or ten years was all that $Nephi_1$ and his priests could muster. Both of these restrictive alternatives for the number-terms of First Nephi may be compared with the proposed symbolism of number-terms in Second Nephi and in the major divisions created by later writers in the small plates of Nephi. However, before proceeding into those discussions, a few additional implications regarding the number-term symbolism in First Nephi will be noted.

3.2.20 Symbolic amplifications

Table 3.C includes two proposed Set-contexts that relate to the sidereal periods of the planets Mercury and Venus. The Set-sum 1230 implies a shorter near accord with 14 mean sidereal periods of Mercury (about 1231.571 days). This near accord suggests that 14 sidereal periods of Mercury would have close accords with 1231 and 1232 days and a longer near accord with 1233 days. Both 1232 days (7x176 = 1232) and 1233 days (9x137 = 1233) represent complete repetitions of two of the most basic whole day cycles listed in Table 3.A. In addition, as Table 3.B indicates, every 13 tropical years, the length of 54 sidereal periods of Mercury could have been identified through the use of geocentric observations and equinox or solstice sighting lines. Counts of 88 or 87 days for each sidereal period could have been calculated. Fourteen sidereal periods of Mercury may be counted with 88 days each: 14x88 = 1232. Alternatively, 14 of such sidereal periods may be counted with 13 periods of 88 days each plus one period of only 87 days: (13x88) +87 = 1231. The mean length of a sidereal period of Mercury suggested by alternating these two close accords of 14 sidereal periods would be 87.96429 days, approximately 7.3 minutes less than the modern estimate (about 87.96939 days). Hence, the observers may have been aware that 14 sidereal periods of Mercury would be completed just after the completion of 45 sidereal months. This is a near commensuration of the positions and cycles of the moon and Mercury within the fixed stars.

In contrast to the proposed Mercury Set-context, the Set-sum 25 implies a 1/9th part of a longer close accord with the Venus sidereal period (about 224.701 days). Table 3.B also includes the eight-tropical-year pattern of geocentric observations from which this sidereal period may have been calculated. Thirteen sidereal periods may be counted with 225 days each: 13x225 = 2925. However, careful observation would have indicated that an interval of 2925 days was three or four days too long. Alternatively, the 13 sidereal periods may have been measured as: (9x225) + (4x224) = 2921 days or (10x225) + (3x224) = 2922 days. The use of 25 days as a component 1/9th part of a single 225-day sidereal period would provide a means to double check the ongoing count of days.

Two Sets and their Set-sums (1209 and 1210) are among the most obvious combinations of number-terms in First Nephi and they seem related to synodic and draconic month intervals. These proposed Set-contexts may suggest that $Nephi_1$ and his people were devotedly observing synodic months for calendrical purposes, but also with regard to eclipses. One may also note in the Set-contexts associated with the Set-sums 1209, 624, and 26 that the 13-day cycle relates to near accords with the lengths of synodic, draconic, and sidereal months. The Set-contexts related to the Set-sums 27, 28, 1224, and 1225 also include 9-day cycles and 7-day weeks. These accords may suggest that by the time $Nephi_1$ composed First Nephi, he and his priests[52] were aware of, and perhaps using, 9-day and 13-day cycles for calendrical, astronomical, and/or agricultural purposes, in addition to their apparent observations of the 7-day week and 12-month year of the Lehi era for religious purposes.

The Set-contexts related to 1209 and 1210 days may suggest further that since a 12-month synodic calendar repeats predictably (the mean is about 354.367 days), the observers at some point relatively early in their journey or voyage may have noted that the moon also returns to approximately the same position in the fixed stars 13 times in about 12 synodic months (the related sidereal year is about 355.182 days). That kind of early, but generalized attention to moon, stars, and simple counts of 12 and 13 may have provided an astronomical foundation for more careful observations and record keeping regarding sidereal and draconic months, fixed stars, and agricultural seasons once the people of Nephi became settled.

Furthermore, the Set-sums 1200-1230 may be interpreted as suggesting a chronological context that is noted in Table 3.C, but not listed as a near or close accord. This context is eclipse-related. A half-eclipse year is the time required for the sun to travel from one node to the other (the mean interval is about 173.31 days). For a period of about five weeks or 34.5 days (an "eclipse season"), the sun and moon both may appear to travel through the same "nodal eclipse zone" in the heavens and one or two eclipses may occur. Consecutive eclipses may transpire about six synodic months apart (the mean interval is about 177.184 days). The Set-sum 1210 and its Set-contexts of 41 synodic months and 44.5 draconic months also may imply an astronomical measure of seven eclipse seasons (sometimes referred to as a "hepton"). The mean length of this interval is about 1213.17 days.[53] The seventh eclipse season would begin after an interval of about 1195.92 days, last for about 34.5 days, and end after about 1230.42 days. The 34.5-day eclipse season also encompasses 45 draconic months (about 1224.55 days) and 41.5 synodic months (about 1225.519 days). In other words, the Set-sums 1200-1230 may suggest the observers' awareness that eclipses may occur 41 to 41.5 synodic months apart.

The foregoing patterns of Set-sums and their implied Set-contexts do not suggest haphazard observation or sporadic record keeping. Rather, the patterns seem to document a capacity, at least by the priest-astronomers, to monitor and predict the different lengths of draconic and sidereal months as measured with whole natural days. The Nephite numerical system apparently

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[52] $Nephi_1$ noted in 2 Nephi 5:26 that he had consecrated his younger brothers, $Jacob_2$ and $Joseph_2$, to be priests "over the land of [his] people". This connection between priests and land may suggest calendrical, astronomical, and agricultural priesthood activities.

[53] E.g., "Periodicity of Lunar Eclipses," in the NASA Eclipse Web Site, accessed at eclipse.gsfc.nasa.gov/LEsaros/LEperiodicity.html; "Periodicity of Solar Eclipses," in the NASA Eclipse Web Site, accessed at eclipse.gsfc.nasa.gov/SEsaros/SEperiodicity.html; R.H. van Gent, "A Catalogue of Eclipse Cycles," accessed at webspace.science.uu.nl/~gent0113/eclipse/eclipsecycles.htm; and "Year" in Wikipedia, accessed at en.wikipedia.org/wiki/Year#Draconic_year.

did not express fractions, other than as rather simplistic "parts";[54] so, the apparent measurement of draconic and sidereal months as intervals of natural days suggests the observers' grasp of certain consistencies in the movements of the moon and a remarkable accuracy in their knowledge of, and ability to predict, lunar events. A further implication may be that in the cultural context of the observers' location, eclipse seasons may have been particularly important.

To be able to accomplish the lunar observations necessary to acquire precise data about draconic, sidereal, and synodic months, and planetary synodic periods, the priest-astronomers apparently were able to use a clear pattern in the fixed stars and an understanding of the tracks of the sun and moon through that stellar pattern. To be able to observe and calculate the Mercury and Venus sidereal period data, they apparently had to have a constant point from which to observe the seasonal movements of the sun, in addition to at least one fixed star for noting the planet's return to the same point in the heavens. Of course, it also may have been possible that $Nephi_1$ and his followers, in obtaining a stable environment in which to settle, were given access to the records of their closest neighbors who were using such resources at least in part for agricultural purposes and were willing to share them with a new agricultural community. In either case, some awareness of sidereal months and of the sun's and moon's tracks through the fixed stars may have arisen during the trek of $Lehi_1$'s followers through the desert and their voyage at sea. Detailed observations and record keeping regarding the moon, planets, and stars seem likely to have been practices that would have been difficult to undertake until $Nephi_1$ and his followers were established in the land of Nephi.

The 13 Sets and 25 Set-sums proposed for combinations of the First Nephi number-terms appear to symbolize Nephite perceptions of time and its natural patterns that were shorter than a Nephite era. These temporal patterns suggest not only the diligence of the followers of $Lehi_1$ in tracking the passage of time astronomically, but their continued devotion to the teachings of $Lehi_1$ in a new land, and their constancy in measuring and recording time in the 600-year interval revealed to $Lehi_1$. $Nephi_1$ seems to have been committed to ensuring that his people knew the measurement of the Lehi era context had been consistent, accurate, and recorded.

He also seems to have intended the symbolic use of number-terms and their Set-sums to help him describe the time keeping culture in which the people of Nephi were established in the "land of promise". The Set-sums 625 and 1200 may be interpreted as suggesting calendrical statements that are consistent with sixth century BCE Mesoamerican measurements of a 365-day calendar. These statements may be depicted by the equations 365+260 = 625 and (365x3) +105 = 1200. These Set-sums do not imply near or close accords with full 365-day years; however, they do suggest close accords with two composite parts of a Mesoamerican 365-day calendar year (260 and 105 days). The 365-day calendars possibly familiar to $Nephi_1$ may have included an Egyptian one[55] in which the 5-day epagomenal period followed the 360-day period of 12 idealized (30-day) lunar months[56] [symbolized by the equation (12x30) +5 = 365] and Mesoamerican ones in which the 5-day period followed or preceded the 360-day period of 18 distinctive (20-day) months [represented by the equations (18x20) +5 = 365 or 5+ (18x20) = 365]. Both 30-day and 20-day cycles are implied Set-contexts of the Set-sum 1200. These

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[54] See Division 1, Part 4, Section 4.4.4.

[55] 1 Nephi 1:2-3.

[56] Parker, *The Calendars of Ancient Egypt*, 7.

proposed combinations of 260-day and 105-day calendrical intervals imply both types of Mesoamerican 365-day calendars in which the 5-day period comes after or before the 360-day period of the year. When the 5-day period follows the 18 20-day months, the calendar is divided into 13 initial months and five concluding months plus the final five days: (13x20) + (5x20) +5 = 260+105 = 365. When the 5-day period precedes the 18 20-day months, the calendar is divided into five days plus five initial months and 13 concluding months: 5+ (5x20)+(13x20) = 105+260 = 365.

In the Mesoamerican Preclassic or Formative Period (about 2000 BCE to 250 CE), "the earliest recognizable calendrical glyphs are Olmec, possibly those carved in stone at Chalcatzingo, perhaps as early as 1150-900 [BCE]".[57] "The earliest evidence we have [of the 260-day and 365-day calendars being combined into the unique "Calendar Round" chronological system of Mesoamerica], probably dating to the seventh century [BCE], indicates the presence among the Olmec of a fully developed [C]alendar [R]ound that is obviously cognate with and almost certainly ancestral to all the … forty-eight [Mesoamerican] calendars we can examine".[58] This "ancestral" 365-day year was "terminally named", i.e., its "name day" in the 260-day calendar was the last day of the 360-day portion of the year and, hence, the full 365-day year associated with a particular "name day" began with the 5-day epagomenal period.[59] This 5-day interval appears to have been "ignored" for the purpose of naming a year "because it is generally viewed as a kind of calendrical hiatus between years—a time of special danger or even of horror—and its days were said to be useless, lost, or even nameless".[60] Thus, when $Nephi_1$ created the Set-sums 625 and 1200 in First Nephi, he seems to have chosen them as symbolic ways to compare Egyptian and Mesoamerican 365-day calendars. Indeed, these Set-sums are the first two of eight Set-sums that appear to have been created by $Nephi_1$ for this purpose. Four more are proposed in the analysis of Second Nephi and two more in the analysis of $Nephi_1$'s combined books.

As a concluding calendrical note for First Nephi, the duplicated Set-sum 1228 and the non-duplicated Set-sum 1229 may be discussed in terms of their potential Mesoamerican symbolism. The above Sections 3.2.6, 3.2.15, and 3.2.16 suggested that the Set-sums 1228 and 1229 represent close accords with 1.5 Mesoamerican 819-day cycles (1228.5 days). The 819-day cycle is listed in Table 3.A with the parenthetical "(7x9x13)". In the 1940s, Thompson identified intervals of 819 days in five Classic period Maya texts and noted the arithmetic connection 7x9x13 = 819. He described the numbers 7, 9, and 13 as being of "great ritualistic importance" because seven probably represented "the seven layers of the earth", nine represented "the nine underworlds and the nine lords of the nights", and 13 represented "the thirteen heavens". "[O]nly after 819 days would sequences of nine lords of the underworlds, 13 lords of the heavens, and the presumed seven lords of the earth once more coincide". Thompson also suggested possible relationships between the 819-day interval, solar and lunar observations, and the computing year of 364 days (4x7x13 = 364).[61]

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[57] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 98.

[58] Ibid., 17.

[59] See Sections 3.9 through 3.12 below for a more detailed discussion of the 260-day and 365-day calendars and their association with the stated cardinal number-term letter-set apparently created by Enos.

[60] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 9-10.

[61] Thompson, *Maya Hieroglyphic Writing: Introduction*, 212-17.

Attempts to comprehend the meanings associated with the 819-day cycle since Thompson began to understand it have suggested that it is a component aspect of "the quadripartite nature of Mesoamerican space and time".[62] The priest-astronomers apparently "divided the progression of time into quadrants of 819 days each" and the four gods (each a K'awil) who ruled these quadrants were distinguished by their associated colors and directions: red-east, white-north, black-west, and yellow-south.[63] Four of such cycles suggest a 3276-day cycle (4x7x9x13). This cycle is the equivalent of nine computing years (364x9 = 3276). Grofe has suggested that the 7-day, 9-day, and 260-day cycles may have been "used together to determine the eclipse year and the draconic month as they moved through the tropical year over long periods of time". He also noted that "these three cycles commensurate in 20x819 days" (819x20 = 16380) and that the period of 16380 days appeared in "Classic period inscriptions from Palenque".[64] Apparently, no documentation for an 819-day cycle has been discovered in Preclassic Mesoamerican contexts; so, that suggests caution in recognizing this Set-context. Furthermore, the meanings associated with the ancient 819-day cycle do not yet appear to be understood.

As to the Set-sums 1228 and 1229 in First Nephi, the apparent reason for $Nephi_1$ noting the measurement of 1.5 819-day cycles is simple. The 65 unique values examined in First Nephi do not include 819 or 1638; so, symbolizing one or two 819-day cycles with the number-terms of First Nephi was impossible. Nevertheless, the Set-sums 1228 and 1229 are the first two of four proposed Set-sums that seem to be associated with the 819-day cycle in $Nephi_1$'s writings. One more Set-sum appears in Second Nephi, where it associates the 819-day cycle with the number 20. The fourth Set-sum is associated with number-terms in both of $Nephi_1$'s books and it suggests an interval of 2.5 819-day cycles. Two more Set-sums apparently related to 819-day cycles were surely composed by $Nephi_1$, but they occur in connection with the first temporal-expression recorded by $Jacob_2$ and in combined writers' Sets that will be discussed after the Sets in the major divisions have been addressed. With that concluding note, the examination of number-terms in Second Nephi may proceed.

3.3 The Book of Nephi [Second Nephi] number-terms

$Nephi_1$ separated his writings into two books, both of which begin with the title, "The Book of Nephi". As a result, he separated his 17 temporal-expressions into two major divisions. Eleven appear in First Nephi and six appear in his second book (usually referred to as Second Nephi or 2 Nephi). The diction, language types, and positions of the six number-terms in this major division occur in the following order:

1. "thirty", a stated cardinal or L number-term that creates the (L) letter-set symbolizing additional interim nights of the waning moon;
2. "forty", another L number-term that is part of the same letter-set;

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[62] Aveni, *Empires of Time*, 204-07.

[63] Schele and Freidel, *A Forest of Kings*, 78. See also Heinrich Berlin and David H. Kelley, "The 819-day Count and Color-direction Symbolism among the Classic Maya", *Middle American Research Institute, Publication 26* (New Orleans, 1961), 9-20 preprint, accessed at archive.org.

[64] Grofe, "Glyphs G and F: the cycle of nine, the lunar nodes, and the draconic month", 149.

3. "the", a referenced ordinal or M number-term that creates an (M) letter-set which seems to symbolize the last visible crescent of the synodic month and may imply the end of a synodic month in an Egyptian chronological system;
4. "threescore and five", a stated cardinal or L number-term that creates the first (L) letter-set in $Nephi_1$'s concluding (LML) letter-group;
5. "the", another referenced ordinal or M number-term that creates the central (M) letter-set in $Nephi_1$'s concluding (LML) letter-group; and
6. "six hundred", a stated cardinal or L number-term that creates the last (L) letter-set in $Nephi_1$'s concluding (LML) letter-group.

Although $Nephi_1$ organized, wrote, and engraved both of his books, he did not compose all the temporal-expressions. As to the number-terms $Nephi_1$ used in Second Nephi, one number-term ("six hundred") appears to have originated with $Lehi_1$, three number-terms are quoted from the brass plates' version of the Book of Isaiah ("the" twice, and "threescore and five"), and just two number-terms were composed by $Nephi_1$ ("thirty" and "forty"). Thus, three writers originated the six number-terms that appear in Second Nephi.

First Nephi and Second Nephi each provide four stated number names that may be examined by themselves and by adding them into 11 possible combinations of two or more definite number names (for a total of 15 numbers to be examined). This process assumes that the number name expressed in a number-term is not used twice in a single combination. Second Nephi also includes two referenced ordinal or M number-terms ("the"), which use identical diction. Like the two referenced cardinal or N number-terms in First Nephi, the interpretation of the M number-terms in Second Nephi has to be consistent. If they are deemed to imply no definite value, then neither of them is represented by a zero (0); rather, they are disregarded. If one is deemed to imply a definite value, then the other is deemed to imply a consistent, definite value. Their referenced numbers are different, of course, because their temporal-expressions have to do with the temporal numbers associated with the lives of two different kings of Judah.

3.3.1 The 30-year interval

The first number-term in Second Nephi is a stated cardinal or L number-term composed by $Nephi_1$ for the temporal-expression "thirty years had passed … from the time we left Jerusalem".[65] Thirty 12-month lunar years or 360 mean synodic months would be about 10631.012 days. Based on the astronomical and calendrical intervals listed in Table 3.A, the 30-year interval suggests the calendrical equivalents of 60 6-month lunar semesters and 20 18-month lunar years.

It might be proposed that a period of 10631 natural days suggests a single "short empiric sidereal interval" or "SESI" of the planet Saturn, which is listed in Tables 3.A and 3.B. The mean length of a Saturn SESI appears to have been about 10637.2 days, but intervals computed from the data used by Aveni, Bricker, and Bricker varied from about 10628.1 days to about 10646.3 days.[66] One of the difficulties with this proposal is that $Lehi_1$ and his followers apparently had no way to observe and measure the sidereal periods of bright planets with respect

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[65] 2 Nephi 5:28.

[66] See Section 3.1.7 above and Tables 3.A and 3.B of this Division.

to stable solar sighting lines during much, if not the majority, of the 30-year period. Thus, $Nephi_1$ could not have chosen to mention the 30-year period on the basis of a Saturn SESI, unless he had access to New World records of such intervals being observed by the Nephites' closest neighbors. The small plates of Nephi provide no direct evidence of such astronomical cooperation between neighbors, which does not mean that it did not occur. $Nephi_1$, however, provides an express explanation for his intentional listing of the 30-year period. When that number of Lehi calendar years had passed away, God commanded him to create a religious record of the Nephites' origin, ministries, and prophecies. The timing of that commandment is the reason the end of 30 years is mentioned. The similarity of the lengths of 30 12-month lunar years and a Saturn SESI, which is more than 120 days less than the sidereal period of Saturn, seems to be coincidental.

3.3.2 The 40-year interval

$Nephi_1$'s second number-term in Second Nephi is another stated cardinal or L number-term that appears in the brief temporal-expression "forty years had passed".[67] Forty 12-month lunar years or 480 mean synodic months would be about 14174.683 days. This interval suggests close accords with 80 6-month lunar semesters and with 7-day weeks and 9-day cycles (7x2025 = 9x1575 = 14175). Other than these close accords, a period of 14174 or 14175 days does not appear to present a near or close astronomical or calendrical accord with an interval listed in Table 3.A.

3.3.3 The 65-year interval

The third stated cardinal or L number-term in Second Nephi occurs in part of $Nephi_1$'s quotation from $Isaiah_1$'s writings. The temporal-expression is "within threescore and five years".[68] This 65-year period most likely was to be measured with the chronological system of the kingdom of Judah, which was familiar to $Isaiah_1$, i.e., with an intercalated 12-month lunar year. The equivalent period in mean tropical years would be about 23740.742 days; however, since lunar intercalation appears to have been both episodic and manipulable, the lunar interval may have been equivalent to 803 mean synodic months (about 23713.064 days) if an intercalation had been postponed or 804 mean synodic months (about 23742.594 days) if the intercalations had kept the lunar year in step with the seasonal or solar year. Other than synodic months, a period of 23742 or 23743 days does not appear to present a near or close astronomical or calendrical accord with an interval listed in Table 3.A. The difference between 65 mean tropical years and 804 mean synodic months is about 1.82 natural days. A period of 804 mean synodic months is equivalent to 67 12-month lunar years, which suggests that 24 synodic months were added during a 65-year period of intercalated lunar years.

3.3.4 The 600-year interval

The fourth stated cardinal or L number-term in Second Nephi occurs in a temporal-expression that appears to have been composed by $Nephi_1$, but the number-term itself seems to

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[67] 2 Nephi 5:34.

[68] 2 Nephi 17:8; see also Isaiah 7:8.

have originated in a prophecy delivered to, and recorded by, his father $Lehi_1$.[69] $Nephi_1$'s temporal-expression is "in six hundred years from the time that my father left Jerusalem".[70] Based on the length of a mean synodic month, 600 12-month years or 7200 synodic months would be about 212620.248 days. The interval of 7200 months also may be sorted as 400 18-month years. Other than synodic months, a period of 212620 or 212621 days may suggest a near accord with the length of 2417 mean sidereal periods of Mercury (about 212622.016 days). The difference in the two mean astronomical intervals is about 1.78 days.

3.3.5 Ambiguous referenced ordinal number-terms

Part 4 of Division 1 introduced the two referenced ordinal or M number-terms that appear in Second Nephi.[71] These number-terms are part of $Nephi_1$'s quotation from the writings of $Isaiah_1$ recorded in the brass plates. The temporal-expressions are "[i]n the year that king Uzziah died"[72] and "[i]n the year that king Ahaz died".[73] In each expression, the number-term is the determiner *the*, which appears to denote only its related year- and time-terms.[74] Each of these M number-terms reference a definite year, but there is no previously stated ordinal number-term associated with either year in the small plates of Nephi. Presumably, the definite year numbers, like the Book of Isaiah itself, were intended by $Nephi_1$ to be found in the brass plates. This set of plates contained "the five books of Moses", followed by "a record of the Jews from the beginning, even down to the commencement of the reign of Zedekiah, king of Judah, and also the prophecies of the holy prophets from the beginning, even down to the commencement of the reign of Zedekiah, and also many prophecies which have been spoken by the mouth of Jeremiah".[75] Some version of the Book of Kings apparently was included in the brass plates. The ambiguities related to these two M number-terms arise when the definite years connected with the reigns of Uzziah and Ahaz are studied.

In the KJV Bible, 2 Kings 15:2 notes that "[s]ixteen years old was [Azariah aka Uzziah[76]] when he began to reign, and he reigned two and fifty years in Jerusalem". Also, 2 Kings 16:2 notes that "[t]wenty years old was Ahaz when he began to reign, and reigned sixteen years in Jerusalem". Part of the complexity in understanding $Nephi_1$'s use of these Hebrew Scripture texts is that the periods described with cardinal numbers apparently must be converted into definite ordinal numbers, each of which is associated with the singular word *year* that is used in the M number-terms quoted in Second Nephi. Did king Uzziah die in the 52nd or 53rd year of his reign? Or did he die in the 68th (16+52) or 69th (16+53) year of his life? Did king Ahaz die in the 16th or 17th year of his reign? Or did he die in the 36th (20+16) or 37th (20+17) year of his life? These eight alternative intervals for the ordinal numbers referenced in Second Nephi must be considered.

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[69] 1 Nephi 1:16-17; 6:1.

[70] 2 Nephi 25:19.

[71] See Division 1, Part 4, Sections 4.6.1-4.6.2.

[72] 2 Nephi 16:1; see also Isaiah 6:1.

[73] 2 Nephi 24:28; see also Isaiah 14:28.

[74] The determiner *the* is used elsewhere in the *Book of Mormon* as a referenced ordinal or M number-term. See 3 Nephi 1:1 ("the year that Lachoneus was the chief judge and the governor over the land"; 3 Nephi 3:22 ("the year"); and 3 Nephi 7:26 ("the year").

[75] 1 Nephi 5:11-13.

[76] Uzziah is called Azariah in 2 Kings 14:21 and 15:1; compare 2 Chronicles 26:1-3.

As suggested above, one assumption of this analysis is that when the text of 2 Kings 15:2 notes that king Uzziah "reigned two and fifty years", the passage in 2 Nephi 16:1 means that it was "in [his 52nd regnal] year [when] king Uzziah died". The alternative assumption is that when 2 Kings 15:2 notes that king Uzziah "reigned two and fifty years", the passage in 2 Nephi 16:1 means that 52 complete regnal years had ended and it was "in [his 53rd regnal] year [when] king Uzziah died". Similar alternative assumptions regarding the length of a reign or a life produce the other six ordinal numbers listed above.

Another part of the complexity of analyzing these quoted number-terms of $Isaiah_1$ is that both "the year" phrases appear to specify ordinal referenced numbers (52nd, 53rd, 68th, or 69th for Uzziah and 16th, 17th, 36th, or 37th for Ahaz). However, when the referenced numbers are used for the computation of potential combinations in Second Nephi and referenced ordinals for Uzziah and Ahaz are used in the same combination, the proposed ordinals must be paired for interpretative consistency. In other words, 52nd for Uzziah must be paired with the consistent alternative, 16th for Ahaz, 53rd for Uzziah must be paired with 17th for Ahaz, and so forth. Moreover, when each of these pairs of consistent alternatives is placed into a proposed combination with the Second Nephi cardinal numbers, the ordinal numbers are converted into related cardinal numbers for simplicity and clarity. For example, a possible combination composed of the number-terms quoted from the writings of $Lehi_1$ and $Isaiah_1$ could be 52+65+16+600 = 733. The consistently interpreted ordinal numbers 52nd and 16th are paired and converted into the cardinal numbers 52 and 16. However, a possible combination could not be 52+65+37+600 = 754 because 2 Kings 15:2 expressly states "two and fifty years", but 2 Kings 16:2 does not expressly state "seven and thirty". The historical statements in 2 Kings 15:2 and 16:2 have not been interpreted in a consistent manner. The number 37 is derived by adding the stated 20 and 16 years and assuming that 36 years had ended and the 37th year from the birth of Ahaz was in progress when he died. In the following analysis, the cardinal number alternatives 52 and 16, 53 and 17, 68 and 36, or 69 and 37 are used as consistent pairs in each proposed combination that includes both M number-terms.

3.3.6 Potential combinations

If the four stated cardinal or L number-terms in Second Nephi are sorted into a single group, so that the referenced ordinal or M number-terms are deemed to be separate and to provide no definite quantification, then the four definite number names in Second Nephi may be examined by themselves and by adding them into 11 possible combinations of two or more number names (for a total of 15 numbers to be examined). This process assumes that the number name expressed in a number-term is not used twice in a single combination. This process for combining the four stated number-terms in Second Nephi is the same process used for combining the four stated number-terms in First Nephi.

If $Isaiah_1$'s first quoted "the" number-term were deemed to represent the 52nd year, so that five definite numbers were being combined, the cardinal number 52 by itself and an additional 15 possible combinations would occur (for a total of 31 numbers to be examined). Alternatively, if $Isaiah_1$'s first quoted "the" number-term were deemed to represent the 53rd year, the cardinal number 53 by itself and an additional 15 possible combinations would occur (for a total of 47 numbers to be examined). If $Isaiah_1$'s second quoted "the" number-term were deemed to represent 16, again so that just five definite numbers were being combined, the cardinal number 16 by itself and an additional 15 possible combinations would occur (for a total of 63 numbers to

be examined). Alternatively, if Isaiah$_1$'s second quoted "the" number-term were deemed to represent 17, again so that just five definite numbers were being combined, the cardinal number 17 by itself and an additional 15 possible combinations would occur (for a total of 79 numbers to be examined).

Both of Isaiah$_1$'s "the" number-terms may be added to the original four cardinal numbers and their 11 combinations. However, because of the requirement of consistent interpretation, these new combinations only occur with four distinct pairs: 52 and 16 (or the combined sum 68), 53 and 17 (or the sum 70), 68 and 36 (or the sum 104), or 69 and 37 (or the sum 106). Thus, if Isaiah$_1$'s two quoted "the" number-terms were deemed to represent the combined sum 68, so that another slightly different five definite numbers were being combined, that sum 68 by itself and an additional 15 possible combinations would occur (for a total of 95 numbers to be examined). This same process may be duplicated to create more combinations with the combined sums 70, 104, and 106. In summary, 12 different cardinal numbers that it is possible to combine in the limited ways discussed above (30, 40, 65, 600, 52, 53, 16, 17, 68, 70, 104, and 106) result in 143 numbers to be examined in total (of which eight numbers represent duplicates; e.g., 30+40 = 70 = 53+17). Dozens of the 143 express numbers and combination sums suggest near or close commensurations with other chronological intervals. However, the analysis of number-terms in Second Nephi, like that in First Nephi, does not begin with lists of near or close accords or commensurations. The analysis begins with, and its proposals regarding number-term combinations are derived from, the text of Nephi$_1$'s writings—including comparisons with the analysis of number-terms in First Nephi.

The 143 possible combinations of number-term values produce 135 unique values (proposed values of number-terms themselves and many combination sums). The other eight values are duplicates. Seven (4.9%) of the 143 combinations and nine (6.7%) of the 135 unique values appear to make up the text-based Sets and Set-sums that imply Nephite chronological culture. The remaining 136 possible combinations (95.1%) and 126 unique values (93.3%) have been deemed to be incidental or ancillary to the proposed purposes of Nephi$_1$'s number-terms in Second Nephi. Each of the seven proposed Sets is based on the diction, language types, and placements of year-related expressions and their narrative-links in Second Nephi. In that regard, it apparently is not coincidental that, as noted above, four stated number-terms occur in First Nephi and four stated number-terms occur in Second Nephi. The analysis of Sets in Second Nephi begins with a Set created by Nephi$_1$'s second group of four stated number-terms.

3.3.7 The Set with Set-contexts of 735 days

Set definition. Because Second Nephi begins with its own title and introductory declaration[77] and a series of narratives about the difficult origin of the people of Nephi in the New World,[78] Nephi$_1$ clearly intended Second Nephi to be a separate major division of his small set of plates. He also appears to have carefully planned the diction, language types, and placements of the number-terms he composed for, or quoted and placed in, Second Nephi.[79] In

[77] See Division 10, Part 3, "Identifying major divisions in the plates".

[78] E.g., 2 Nephi 1:1-4:12 (Lehi$_1$'s dying words to his sons and "all his household"); 4:13-5:4 (mourning, anger, and threats); 5:5-7 (Nephi$_1$ and his followers flee from the threats of Laman$_1$ and his followers); 5:8-20 (settlement of the people of Nephi).

[79] See Division 2, Parts 1-2.

addition, as discussed above with regard to First Nephi, the diction, language type, and placement of a number-term in the text, at least with respect to its major division, appears to have had two chronological meanings for $Nephi_1$: the express meaning associated with the quantification of a year-term and the Set-contexts or other symbolic meanings associated with text-based Sets of number-terms.

The first proposed Set of number-terms in Second Nephi is based on the distinct difference between stated number-terms and referenced number-terms. A stated number-term always provides a definite number, but a referenced number-term may or may not contribute the definite number it implies. In this first proposed Set, all stated cardinal or L number-terms in Second Nephi occur as definite numbers and both referenced ordinal or M number-terms in this book are treated as being quantitatively indefinite.

Set and Set-sum illustration. This proposed Set and Set-sum may be symbolized by the equation 30+40 + □ +65+ □ +600 = 735. Each of the four L number-terms provides its definite number to the Set and is associated with an express plural or B year-term in the (BABAB) year-term letter-group of Second Nephi. Each M number-term is represented by the symbol of an empty box and is associated with an express singular or A year-term in the (BABAB) year-term letter-group of Second Nephi. As in the analysis of the First Nephi number-terms, empty boxes are used in the equation because neither referenced number-term states a complete and definite number name and a zero (0) is not a numeral that appears in the *Book of Mormon*.[80] The Set-sum 735 is duplicated by one of the other 142 possible combination sums, which is discussed below.

Set-contexts. Two Set-contexts implied by the proposed Set-sum 735 may be described as close accords with the lengths of 105 7-day weeks (7x105 = 735) and 27 mean draconic months (about 734.73 days). In First Nephi, the Set composed of the four stated number-terms suggested Set-contexts related to 13-day cycles and synodic months. Thus, each of $Nephi_1$'s major division Sets that are composed only of stated number-terms suggest Set-contexts involving a basic day cycle and some type of lunar month, all of which appear to have calendrical and eclipse related connotations. In terms of the Lehi era, synodic months are suggested in First Nephi and 7-day weeks are suggested in Second Nephi. In terms of Mesoamerican chronological systems, 13-day cycles seem to be suggested in First Nephi and draconic months in Second Nephi.

Like the proposed Set-sums 625 and 1200 in First Nephi, the proposed Set-sum 735 also may be interpreted as a calendrical statement symbolized by the equation (365x2) +5 = 735. This equation implies another interval related to a "terminally named" Mesoamerican 365-day calendar. This Set-sum 735 is the third of eight proposed Set-sums apparently composed by $Nephi_1$ to compare Egyptian and Mesoamerican 365-day calendars.[81] Dividing a 365-day year into two portions (5 and 360) and placing the 5-day period ahead of the 360-day period seems to imply a sixth century BCE Mesoamerican calendar and differentiates it from the Egyptian 365-day calendar, which appears to have placed the 5-day period after the 360-day period and to have been in use for more than 1800 years before the times of $Lehi_1$ and $Nephi_1$.[82]

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[80] See Division 1, Part 4, Section 4.2.3.

[81] Compare the concluding two paragraphs in Section 3.2.20 above.

[82] Parker, *The Calendars of Ancient Egypt*, 51-56.

3.3.8 The Set with Set-contexts of 68, 70, 104, and 106 days

Set definition. The second proposed Set in Second Nephi also sorts number-terms on the basis of the distinction between stated and referenced number-terms. This Set is the number-term and year-term complement of the first proposed Set and is composed of both M number-terms (each the determiner "the"). The M number-terms are associated with the express singular or A year-terms in the (BABAB) year-term letter-group of Second Nephi. The referenced ordinal or M number-terms are interpreted as though they imply definite quantification. The quantitative meanings of "the" are deemed to provide: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death.

Set and Set-sum illustration. The Set and Set-sums may be represented by the equation □ + □ +52+ □ +16+ □ = 68, the equation □ + □ +53+ □ +17+ □ = 70, the equation □ + □ +68+ □ +36+ □ = 104, and the equation □ + □ +69+ □ +37+ □ = 106. The empty boxes represent the stated cardinal or L number-terms that are associated with express plural or B year-terms. The Set-sums 68, 104, and 106 have no duplicate combination sums, but the Set-sum 70 is duplicated by one other combination sum, which is discussed below.

Set-contexts. The Set-sum 68 implies two Set-contexts: close accords with the lengths of 2.5 mean draconic months or 5 mean half-draconic months (about 68.031 days) and 2.5 mean sidereal months (about 68.304 days). The Set-sum 70 suggests three Set-contexts: a close accord with 10 7-day weeks (7x10 = 70) and two near accords with the lengths of 2.5 mean draconic months or 5 mean half-draconic months and 2.5 mean sidereal months. The Set-sum 104 implies close accords with the lengths of 8 13-day cycles (13x8 = 104) and 3.5 mean synodic months (about 103.357 days). The Set-sum 106 does not imply a near or close accord with any interval listed in Table 3.A; however, it may suggest an observable part (106x5 = 530) of a near accord with an 18-month lunar year (about 531.551 days).

3.3.9 The Set with Set-contexts of 70 days

Set-definition. The third proposed Set combines the two stated cardinal or L number-terms that are associated with verbal or R narrative-links in Second Nephi. These are the two number-terms in Second Nephi that appear to have been composed entirely by $Nephi_1$. These consecutive R narrative-links (both "had passed") form the central R letter-set in the (RQRQR) narrative-link letter-group that $Nephi_1$ started in First Nephi and $Jacob_2$ finalized in the Book of Jacob with the (R) letter-set that he created and his descendants and $Mormon_2$ filled.

Set and Set-sum illustration. This proposed Set and Set-sum may be depicted by the equation 30+40+ □ + □ + □ + □ = 70. The empty boxes represent the stated cardinal or L number-terms and the referenced ordinal or M number-terms that are associated with prepositional or Q narrative-links. This Set-sum 70 is duplicated by the Set-sum 70 noted above.

Set-contexts. This Set-sum 70 also implies a close accord with 10 7-day weeks (7x10 = 70) and two near accords with the lengths of 2.5 mean draconic months or 5 mean half-draconic months (about 68.031 days) and 2.5 mean sidereal months (about 68.304 days).

3.3.10 The Set with Set-contexts of 733, 735, 769, and 771 days

Set definition. The fourth proposed Set of Second Nephi is composed of all the number-terms associated with prepositional or Q narrative-links. This Set is the narrative-link complement of the third proposed Set. The M number-terms in this fourth Set are interpreted as though they imply definite quantification, i.e., "the year that king ... died" refers either to the year computed from the beginning of the king's reign or to the year computed from the king's birth. These M number-terms provide: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death.

Set and Set-sum illustration. The Set and Set-sums may be represented by the equation □ + □ +52+65+16+600 = 733, the equation □ + □ +53+65+17+600 = 735, the equation □ + □ +68+65+36+600 = 769, and the equation □ + □ +69+65+37+600 = 771. The empty boxes represent the stated cardinal or L number-terms that are associated with verbal or R narrative-links. The Set-sums 733, 769, and 771 have no duplicate combination sums, but the Set-sum 735 is duplicated by the Set-sum 735 discussed above.

Set-contexts. The Set-sum 733 suggests a Set-context representing a near accord with the length of 27 mean draconic months (about 734.73 days). The duplicated Set-sum 735 implies close accords with the lengths of 105 7-day weeks (7x105 = 735) and 27 mean draconic months (about 734.73 days). The proposed Set-sum 735 also may suggest a calendrical statement symbolized by the equation (365x2) +5 = 735. This duplicate is the fourth of eight proposed Set-sums apparently composed by $Nephi_1$ to distinguish Egyptian and Mesoamerican 365-day calendars. The Set-sum 769 implies a near accord with the length of 26 mean synodic months (about 767.795 days). The Set-sum 771 does not imply a near or close accord with any interval listed in Table 3.A.

3.3.11 The Set with Set-contexts of 803, 805, 839, and 841 days

Set definition. The fifth Set proposed for Second Nephi is composed of all the number-terms. Again, the quantitative meanings of the referenced ordinal or M number-terms are deemed to be: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death.

Set and Set-sum illustration. The Set and Set-sums may be symbolized by the equation 30+40+52+65+16+600 = 803, the equation 30+40+53+65+17+600 = 805, the equation 30+40+68+65+36+600 = 839, and the equation 30+40+69+65+37+600 = 841. The Set-sums 803, 805, 839, and 841 have no duplicate combination sums.

Set-contexts. The Set-sum 803 suggests a close accord with the length of 29.5 mean draconic months (about 802.76 days). This Set-sum also appears to provide the fifth of eight proposed Set-sums apparently composed by $Nephi_1$ to distinguish Egyptian and Mesoamerican 365-day calendars. The suggested calendrical statement may be represented by the equation (365x2) +73 = 803. The symbolism of this statement is discussed in Section 3.3.15 below. The Set-sum 805 implies close accords with the lengths of 115 7-day weeks (7x115 = 805) and 29.5 mean sidereal months (about 805.989 days). The Set-sum 839 does not imply a near or close accord with any interval listed in Table 3.A; however, this Set-sum appears to be the third of four proposed Set-sums composed by $Nephi_1$ to describe periods of time related to the Mesoamerican

819-day cycle. The symbolism of the chronological statement 819+20 = 839 also is discussed in Section 3.3.15 below. The Set-sum 841 suggests a close accord with the length of 28.5 mean synodic months (about 841.622 days).

3.3.12 The Set with Set-contexts of 698, 700, 734, and 736 days

Set definition. The last two Sets of number-terms proposed for Second Nephi are complementary Sets divided by their respective time-term types. This sixth Set is composed of the four number-terms that are associated with personalized or G time-terms. The first and last stated cardinal or L number-terms provide the numbers 30 and 600. The referenced ordinal or M number-terms provide: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death.

Set and Set-sum illustration. The Set and Set-sums may be represented by the equation 30+ □ +52+ □ +16+600 = 698, the equation 30+ □ +53+ □ +17+600 = 700, the equation 30+ □ +68+ □ +36+600 = 734, and the equation 30+ □ +69+ □ +37+600 = 736. The Set-sums 698, 700, 734, and 736 are not replicated by any other proposed combination sums.

Set-contexts. The Set-sum 698 suggests a near accord with the length of 25.5 mean sidereal months (about 696.702 days). The Set-sum 700 implies two Set-contexts: close accords with the lengths of 100 7-day weeks (7x100 = 700) and 35 20-day cycles (20x35 = 700). The Set-sum 734 implies a close accord with the length of 27 mean draconic months (about 734.73 days). The Set-sum 736 suggests two Set-contexts: near accords with the lengths of 27 mean draconic months and 27 mean sidereal months (about 737.685 days).

3.3.13 The Set with a Set-context of 105 days

Set definition. In First Nephi, the third proposed Set was composed of all the number-terms (stated and referenced) that were associated with omitted or H time-terms. In Second Nephi, just two stated cardinal or L number-terms are associated with H time-terms. These two stated number-terms constitute the seventh and last of the proposed Sets in Second Nephi.

Set and Set-sum illustration. This Set and Set-sum may be depicted by the equation □ +40 + □ +65+ □ + □ = 105. In the (GHGHG) time-term letter pattern of Second Nephi, the two omitted or H time-terms are associated with the number-terms 40 and 65. $Nephi_1$'s choice to report the passage of 40 years (in no expressly identified calendrical system) permitted him to imply its combination with $Isaiah_1$'s prophesied 65 years (also in no expressly identified calendrical system). The number-terms represented by the empty boxes appear in year-related expressions that have personalized or G time-terms.

Set-context. The Set-sum 105 suggests a close accord with the length of 15 7-day weeks (7x15 = 105). Additionally, as introduced in Section 3.2.20 above, this Set-sum implies a calendrical interval that was a distinct part of Mesoamerican time keeping. This interval provides the sixth of eight proposed Set-sums apparently composed by $Nephi_1$ to distinguish Egyptian and Mesoamerican 365-day calendars. This calendrical aspect of number-term symbolism in Second Nephi is addressed below, after the lunar symbolism suggested by the number-terms has been discussed.

3.3.14 Lunar symbolism of the Second Nephi number-terms

Six of the seven Sets listed above, and nine of the 17 unique values of possible Set-sums may be combined to imply Nephite attention to the distinct lengths of draconic and sidereal months. These lunar Set-contexts suggest the observers' concern with tracking, measuring, and recording draconic and half-draconic months within the contexts of slightly longer sidereal and half-sidereal months. Table 3.D lists the 17 Set-sums as numbers of natural days and identifies the nine Set-sums on which this lunar symbolism in Second Nephi is based.

The Set-sums and their Set-contexts again suggest a clear temporal separation of the lengths of draconic and sidereal months. The following list compares the "Set-context" means of draconic months suggested by the Set-sums and alternating periods of whole natural days (the implied close accords) with the modern estimates of these means (expressed with fractional days).

Month type	Close accords	Implied mean	Modern mean	Difference
draconic	68 or 69 days	27.4 days	27.21222 days	270.4 minutes
draconic	734 or 735 days	27.2037 days	27.21222 days	12.3 minutes
draconic	802 or 803 days	27.20339 days	27.21222 days	12.7 minutes

For sidereal months, the implied means and their comparisons with modern estimates are the following.

Month type	Close accords	Implied mean	Modern mean	Difference
sidereal	68 or 69 days	27.4 days	27.32166 days	112.8 minutes
sidereal	696 or 697 days	27.31373 days	27.32166 days	11.4 minutes
sidereal	737 or 738 days	27.31481 days	27.32166 days	9.9 minutes
sidereal	805 or 806 days	27.30508 days	27.32166 days	23.9 minutes

These comparisons also do not suggest that the larger the number of days associated with a close accord, the more accurate the implied mean length of the month will be. When draconic months are measured with 734 or 735 days, the implied mean is 12.3 minutes less than the modern estimate, but when draconic months are measured with 802 or 803 days, the implied mean is 12.7 minutes less than the modern estimate. Likewise, when sidereal months are measured with 737 or 738 days, the implied mean is 9.9 minutes less than the modern estimate, but when sidereal months are measured with 805 or 806 days, the implied mean is 23.9 minutes less than the modern estimate. These data suggest that the observers may have preferred the accuracy of longer measurements of natural days that reached close accords with observed astronomical events, but they likely were also aware that some shorter measurements were the more accurate ones. Perhaps they sought to find the most accurate astronomical accords to improve the precision of their records and predictions.

Further suggestions about lunar and solar observations may be made with respect to the apparent use of half-draconic, half-sidereal, and half-synodic months for nine of the Set-contexts proposed for Second Nephi. A half-draconic month measures the time it takes the moon to move along its orbital path from one node to the other (about 13.606 days), but a half-sidereal month measures the time for the moon to move along its orbital path through one-half of the fixed stars (about 13.661 days). In 67-70 days (the lunar intervals suggested by the Set-contexts of 68 and 70 days), the mean period of five half-draconic months would be about 68.031 days, but the mean period of five half-sidereal months would be about 68.304 days. The difference in the two

periods is about 7 hours and 17.8 minutes. The moon's differential extent of travel through a constellation of stars probably would be observable over a period of about 7.3 hours. Moreover, in the week-long period of 801 through 807 days (the lunar intervals suggested by the Set-contexts of 803 and 805 days), the mean period of 59 half-draconic months would be about 802.76 days, but the mean period of 59 half-sidereal months would be about 805.99 days. The two measurements of lunar motion and position unquestionably would be noticeable; they are about 3 days, 5 hours, and 31.2 minutes apart. Indeed, in an interval of 807 days, the observers likely would have been aware that the nodes themselves had migrated west through nearly one-eighth (11.8%) of all the fixed stars along the orbital paths of the sun and moon.

A half-synodic month (about 14.765 days) measures the time it takes the phases of the moon to proceed from astronomical full moon to astronomical new moon or vice versa. At astronomical new moon, the relative positions of the sun and moon are described as "conjunction"; they "are in the same … direction as viewed from the earth".[83] Hence, the night is moonless. At astronomical full moon, the relative positions of the sun and moon are described as "opposition"; they are "exactly opposite each other as seen from the earth's surface".[84] Hence, the night is filled with the moon's reflected light from the sun. Both of these positions of the two heavenly bodies (new moon and full moon) may be understood with respect to the positions of the fixed stars as well. Moreover, the capability to observe, measure, and record lunar and solar movements and positions also may suggest that the observers had a carefully plotted chart of constellations[85] of fixed stars, at least along the paths of the sun and moon, and that they were not merely watching a single fixed star or a small cluster of stars by which the monthly return of the moon was measured. These suggestions may indicate further that when $Nephi_1$ composed Second Nephi, he had access to an extensive record of astronomical observations that involved constellations, nodes, and the paths taken by the sun and moon through the heavens, all of which may have been related to eclipse recording and prediction.

3.3.15 Symbolic amplifications

The Set-sums 625 and 1200 in First Nephi have been proposed as calendrical statements that may be represented by the equations 365+260 = 625 and (365x3) +105 = 1200. The Set-sum 105 in Second Nephi also may imply a related calendrical statement. When considered together, these proposed statements suggest that 260-day and 105-day calendrical intervals existed as distinct parts of 365-day calendars understood by $Nephi_1$. The duplicated Set-sum 735 in Second Nephi also has been suggested as a calendrical statement that may be symbolized by the equation (365x2) +5 = 735. All four proposed statements imply differences between the ancient Egyptian 365-day calendar and possible sixth century BCE initially or terminally named 365-day Mesoamerican calendars.

The Mesoamerican 365-day year could be divided into two portions, one of 260 days and the other of 105 days. This division of the year may have been fertility related and seasonal: a

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[83] *The Compact Edition of the Oxford English Dictionary*, I: 519 (conjunction).

[84] Ibid., I: 1999 (opposition).

[85] Compare 2 Nephi 23:10 (Isaiah 13:10).

260-day agricultural season and a 105-day "period of rest".[86] In the initially named Mesoamerican 365-day calendars, the 260-day period (13x20 = 260) preceded the 105-day period [(5x20) +5 = 105]. The first day of these calendars was the New Year and name day of the year (based on the day number and name from the 260-day calendar). This name day reoccurred on the 261st day of these 365-day calendars, which apparently was "the occasion for a special celebration … a kind of 'little New Year.'"[87] In the terminally named Mesoamerican 365-day calendars, the New Year occurred on the sixth day of the year (after the initial 5-day epagomenal period), but the name day of the year occurred on the last day of the 18th 20-day month. That same name day also occurred 260-days earlier, on the last day of the fifth 20-day month in the same year. This earlier 105th day in the terminally named calendar year also appears to have been a "little New Year". Nothing like the Mesoamerican 260/105 or 105/260 split occurred in the Egyptian 365-day calendar, which was divided into three symbolic agricultural seasons: Inundation (*akhet*), Emergence (*peret*), and Harvest or Low Water (*shemu*). Each conceptual "season" within the constantly repeating 365-day calendar year was composed of four idealized lunar (but consistently 30-day) months. The 5-day epagomenal period then followed the 360-day period of 12 30-day months.[88]

The last of the proposed Sets in Second Nephi that may imply $Nephi_1$ was comparing Egyptian and Mesoamerican 365-day calendars is the fifth Set proposed above for this book. This Set is composed of all the numbers stated or referenced in Second Nephi and it results in four alternative Set-sums (803, 805, 839, and 841), three of which suggest Set-contexts implying close accords with half-draconic, half-sidereal, and half-synodic month intervals. For the proposed Set-sum 803, the Set includes the referenced ordinal numbers 52nd and 16th. In 2 Nephi 16:1 (quoting Isaiah 6:1), the temporal-expression is "[i]n the year that king Uzziah died". The phrase "that king Uzziah died" is the central personalized or G time-term in the (GHGHG) time-term letter pattern of Second Nephi. The associated narrative describes the calling of $Isaiah_1$ to be a prophet and the chapter ends with what appears to be his initial prophecy of societal destruction. In 2 Kings 15:2, king Uzziah is said to have "reigned two and fifty years"; so, it is possible that $Nephi_1$ assumed this to mean that it was "in [his 52nd regnal] year that king Uzziah died". That is, $Nephi_1$ took the number 52 as a textual given in the brass plates and applied it to this Set. In 2 Nephi 24:28 (quoting Isaiah 14:28), the temporal-expression is "[i]n the year that king Ahaz died". The phrase "that king Ahaz died" creates the final personalized or G time-term in the (GHGHG) time-term letter pattern of Second Nephi. The associated narrative mentions $Isaiah_1$'s prophecy of societal destruction throughout "whole Palestina". In 2 Kings 16:2, king Ahaz is said to have "reigned sixteen years". Again, it is possible that $Nephi_1$ assumed this to mean that it was "in [his 16th regnal] year that king Ahaz died". Thus, in a consistent manner with 2 Nephi 16:1, $Nephi_1$ may have taken the number 16 as a textual given in the brass plates and applied it to this Set.

If the interval of 803 days were to be interpreted like the intervals of 625, 735, and 1200 days, then the suggested calendrical statement would be (365x2) +73 = 803. In ancient

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[86] An interval of 260 days also is close to the human interval of pregnancy (about nine mean synodic months or 265.775 days). Susan Milbrath, "Maya Astronomical Observations and the Agricultural Cycle in the Postclassic Madrid Codex," *Ancient Mesoamerica*, 28 (2017): 497-98, accessed at cambridge.org/core.

[87] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 10.

[88] Parker, *The Calendars of Ancient Egypt*, 7.

Mesoamerican chronological systems, the number 73 appears to have been used as an important computational number. First, it appears to have been understood as a division (a fifth part) of the 365-day year (5x73 = 365). Second, it appears to have been identified as a division (an eighth part) of a standardized synodic period of Venus (8x73 = 584).[89] The mean synodic period of Venus is about 583.922 days. Thus, the interval of 73 days may have been used for coordinating the synodic period of Venus with the solar year (5x584 = 8x365 = 40x73 = 2920), perhaps with seasonal agricultural and security connotations.[90] Third, the number 73 was an integral aspect of the Calendar Round, which was composed of 52 365-day years or 73 260-day calendars (52x365 = 73x260 = 18980). Thus, the proposed calendrical statement (365x2) +73 = 803 appears to divide a 365-day calendar year into two more portions: 73 days (one-fifth of a solar year) and 292 days (4x73 or one-half of a Venus synodic period). With each of these proposed calendar-related Sets, $Nephi_1$ seems to imply that his knowledge of the Egyptian 365-day calendar included nothing like the 73-based periods, the division of the 365-day calendar into 105-day and 260-day intervals, the mid-year celebration of a "little New Year", or the related initial or terminal naming of the local 365-day calendars.

The interval of 839 days also may be interpreted like the intervals of 625, 735, 803, and 1200 days, but in relation to the Mesoamerican 819-day cycle rather that the 365-day year. In Section 3.3.11 above, the proposed chronological statement of the Set-sum 839 was depicted as 819+20 = 839; however, it may also be depicted as (7x9x13) +20 = 839. This latter depiction adds the crucial Mesoamerican 20-day cycle to the combination of the shorter, but equally basic 7-day, 9-day, and 13-day cycles. The symbolism may be that, in addition to the long-term 819-day cycle, the 20-day cycle was maintained as a continuous calendrical complement. Furthermore, as noted in Section 3.2.20 above, the Classic period inscriptions from Palenque indicated an alternative way to use the 20-day cycle with the 819-day cycle: 819x20 = 16380. In each of these alternative equations, the four most basic cycles of time in Mesoamerica appear to be used in ways that emphasize the 819-day cycle. Thus, the Set-sum 839 is proposed as the third of four Set-sums engraved by $Nephi_1$ to suggest the existence of an 819-day cycle.

The brief history included in Second Nephi describes the establishment of the people of Nephi in a new land.[91] Their settlement apparently occurred in a place where the temporal context may have included the use of initially and terminally named 365-day calendars composed of two divisions of 260 days and 105 days, a concern with the synodic period of Venus perhaps in association with agricultural and security pursuits, and the organization of time and space by 819-day cycles. The fourth of the four Set-sums apparently created by $Nephi_1$ to describe the 819-day cycle (to be discussed below) suggests that the cycle was maintained in four iterations (4x819 = 3276 days) and thus, perhaps, it was linked to the four Mesoamerican

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[89] E.g., Thompson, *Maya Hieroglyphic Writing: Introduction*, 217-29; Aveni, *Empires of Time*, 220-47. Mesoamerican interest in the synodic period of Venus appears to have been first deciphered between 1880 and 1887 CE by Ernst Förstemann, in his studies of the Maya bark paper book known as the Dresden Codex. Michael D. Coe, *Breaking the Maya Code* (New York: Thames and Hudson, 1992), 107-08; see also 227-29.

[90] Aveni, *Empires of Time*, 200-02; Milbrath, "Maya Astronomical Observations and the Agricultural Cycle in the Postclassic Madrid Codex," 489-505; Karl A. Taube and Bonnie L. Bade, *An Appearance of Xiuhtecuhtli in the Dresden Venus Pages* (Washington, D.C.: Center for Maya Research, Research Reports on Ancient Maya Writing, No. 35, 1991), accessed at academia.edu/423385/An_Appearance_of_Xiuhtecuhtli_In_the_Dresden_Venus_Pages; Thompson, *Maya Hieroglyphic Writing: Introduction*, 221.

[91] The proposed familiarity of the people of Nephi with a terminally named 365-day calendar may suggest that they settled in or near an area where proto-Zoquean writing was prevalent, rather than in or near a Maya area where proto-Yucatecan or proto-Cholan writing was typical. Edmonson provides lists of such separate areas in Mesoamerica. Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 170.

color-directions. In their new land, the people of Nephi "did prosper exceedingly, for [they] did sow seed and [they] did reap again in abundance. And [they] began to raise flocks and herds and animals of every kind." The Nephites "lived after the manner of happiness" as they were led by $Nephi_1$ and his two younger brothers, $Jacob_2$ and $Joseph_2$, whom $Nephi_1$ had consecrated to be "priests and teachers over the land of [his] people". Nonetheless, before 40 Lehi calendar years had passed, they had suffered "wars and contentions with [their] brethren".[92] These statements indicate the agricultural and security concerns of the people dwelling in the land of Nephi.

3.4 $Nephi_1$'s combined number-terms

First and Second Nephi, the first two major divisions of the small plates of Nephi, also may have been intended to be analyzed as a single text. Both major divisions were entitled "The Book of Nephi" and both stated that they were being written by "I Nephi". As Table 2.A of this Division indicates, the placement patterns of the various types of year-terms, time-terms, number-terms, and narrative-links appear to extend from First Nephi into Second Nephi. These patterns suggest that $Nephi_1$, at least for some purposes, considered his separate books to be a unified writing. The analysis of the symbolism of year-terms, time-terms, and narrative-links in Part 2 of this Division suggested an intentional combination of $Nephi_1$'s books with respect to these elements. Hence, given the proposed symbolism of number-term Sets and Set-sums analyzed above in this Part, a continuation of the analysis of number-terms within $Nephi_1$'s writings as a whole seems appropriate and perhaps even necessary to obtain a complete understanding of $Nephi_1$'s symbolic use of number-terms. This Section 3.4 analyzes the number-terms in $Nephi_1$'s combined major divisions as though they are contained within a single text.

3.4.1 Potential combinations

If the eight stated number-terms in $Nephi_1$'s writings are sorted into a single group, so that the referenced number-terms are deemed to be separate and to provide no definite quantification, then the eight definite number names may be analyzed by themselves and by adding them into 247 possible combinations of two or more number names (for a total of 255 numbers to be examined). This process assumes that the number name expressed in a number-term is not used twice in a single combination. Of course, because identical number names ("six hundred") appear in three stated number-terms, it is possible for the same repeated number name to occur in a single combination.

Then, if $Isaiah_1$'s first quoted "the" number-term were deemed to represent the 52nd year, so that nine definite numbers could be combined, the cardinal number 52 by itself and an additional 255 possible combinations would occur (for a total of 511 numbers to be examined). Again, if $Isaiah_1$'s first quoted "the" number-term were deemed to represent the 53rd year, the cardinal number 53 by itself and an additional 255 possible combinations would occur (for a total of 767 numbers to be examined). If $Isaiah_1$'s second quoted "the" number-term were deemed to represent 16, again so that just nine definite numbers were being combined, the cardinal number 16 by itself and an additional 255 possible combinations would occur (for a total of 1023 numbers to be examined). Alternatively, if $Isaiah_1$'s second quoted "the" number-term were

[92] 2 Nephi 5:11, 26-27, 34, italics added.

deemed to represent 17, again so that just nine definite numbers were being combined, the cardinal number 17 by itself and an additional 255 possible combinations would occur (for a total of 1279 numbers to be examined).

This process of combining stated numbers and/or alternative groups of referenced numbers could be continued, under the same conditions stated separately for First Nephi and Second Nephi number-terms. Two hundred fifty-nine separate iterations of the combinatory process are possible. The result of all these combinations (taken one at a time up to 13 at a time) is a total of 66559 potential combinations: (259x256) +255 = 66559. Only 1035 (1.6%) of these 66559 separate numbers and combination sums represent unique values. The other 65524 values (98.4%) are duplicates of the 1035 unique values. Because of the three stated number-terms 600, the unique values occur in four ranges: 1-271, 600-871, 1200-1471, and 1800-2071.

Fifty-nine (0.09%) of the 66559 possible combinations are sorted below into 20 proposed Sets of number-terms with 57 (5.5%) of the 1035 unique values as Set-sums. These 59 combinations appear to have been composed as text-based Sets that symbolize aspects of Nephite chronological culture. The remaining 66500 combinations (99.91%) and 978 unique values (94.5%) are deemed to be incidental or ancillary to the proposed purposes of $Nephi_1$'s number-terms. All 20 of the proposed Sets are composed of number-terms sorted from both of $Nephi_1$'s books.

As with the analysis of number-terms in $Nephi_1$'s separate major divisions, the analysis of all number-terms in $Nephi_1$'s writings does not begin with lists of near or close accords or commensurations between the 1035 unique values and the intervals listed in Table 3.A. The analysis begins with, and its proposals regarding number-term combinations are derived from, the text of $Nephi_1$'s writings. That is, each of the 20 proposed Sets and 57 proposed Set-sums is based on the diction, language types, and placements of year-related expressions and their narrative-links in First and Second Nephi. The analysis of Sets in $Nephi_1$'s writings begins with the Set created by $Nephi_1$'s eight stated number-terms.

3.4.2 The Set with Set-contexts of 1944 days

Set definition. The first proposed Set in $Nephi_1$'s combined major divisions is composed by sorting number-terms based on whether they are stated number-terms or referenced number-terms. All eight of $Nephi_1$'s stated (K and L) number-terms are included in this Set and all five of his referenced (M and N) number-terms are excluded.

Set and Set-sum illustration. This Set and its Set-sum may be symbolized by the equation 1+ □ +600+8+ □ + □ + 600+30+40+ □ +65+ □ +600 = 1944. The five empty boxes represent the M and N number-terms. Like this Set, each of the other 19 proposed Sets may be represented by one or more equations representing a combination of number-terms. Each equation has 13 number-terms, each of which is depicted with a definite number or an empty box.

Set-contexts. Two Set-contexts are suggested by the Set-sum 1944: a close accord with the length of 216 9-day cycles (9x216 = 1944) and a near accord with the length of 71.5 mean draconic months or 143 mean half-draconic months (about 1945.674 days).

3.4.3 The Set with a Set-context of 1945 days

Set-definition. The second proposed Set of $Nephi_1$'s combined books adds the referenced ordinal or M number-term, "that same", to the eight stated (K and L) number-terms. The

quantitative meaning of "that same" is certain and, thus, the meaning of this number-term is as definite as that of the stated number-terms in First and Second Nephi. Moreover, the referenced cardinal or N number-terms in First Nephi and the referenced ordinal or M number-terms in Second Nephi appear to represent alternative numbers; so, they are distinguishable from the M number-term in First Nephi.

Set and Set-sum illustration. This proposed Set and Set-sum may be depicted by the equation 1+1+600+8+ □ + □ +600+30+40+ □ +65+ □ +600 = 1945. The four empty boxes represent the N number-terms in First Nephi and the M number-terms in Second Nephi. These four referenced number-terms all are characterized by indefinite quantification.

Set-context. The Set-sum representing 1945 days implies a close accord with the length of 71.5 mean draconic months or 143 mean half-draconic months (about 1945.674 days).

3.4.4 The Set with Set-contexts of 2012, 2014, 2048, and 2050 days

Set definition. The third proposed Set of $Nephi_1$'s combined major divisions is composed of all the stated (K and L) number-terms and both referenced ordinal or M number-terms of Second Nephi (each the determiner "the").

Set and Set-sum illustration. This proposed Set and its alternative Set-sums may be represented by the equation 1+ □ +600+8+ □ + □ +600+30+40+52+65+16+600 = 2012; the equation 1+ □ +600+8+ □ + □ +600+30+40+53+65+17+600 = 2014; the equation 1+ □ +600+ 8+ □ + □ +600+30+40+68+65+36+600 = 2048; and the equation 1+ □ +600+8+ □ + □ +600+ 30+40+69+65+37+600 = 2050. The three empty boxes in each equation symbolize the M and N number-terms in First Nephi. The M number-terms in Second Nephi are interpreted as though they imply definite quantification. This proposed Set assumes that "the year that king ... died" refers either to the year computed from the beginning of the king's reign or to the year computed from the king's birth. These M number-terms provide: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death.

Set-contexts. The Set-sum 2012 suggests a Set-context representing a near accord with the length of 74 mean draconic months (about 2013.704 days). The Set-sum 2014 implies a close accord with the length of 74 mean draconic months. The Set-sum 2048 suggests a near accord with the length of 75 mean sidereal months (about 2049.125 days) and a longer close accord with 2.5 819-day cycles (2047.5 days). This is the fourth of four Set-sums that appear to document the existence of the 819-day cycle in $Nephi_1$'s writings. The Set-sum 2050 implies a close accord with the length of 75 mean sidereal months.

3.4.5 The Set with Set-contexts of 2013, 2015, 2049, and 2051 days

Set definition. The fourth proposed Set of $Nephi_1$'s combined books adds all three M number-terms to the eight K and L number-terms.

Set and Set-sum illustration. This proposed Set and its alternative Set-sums may be depicted by the equation 1+1+600+8+ □ + □ +600+30+40+52+65+16+600 = 2013; the equation 1+1+ 600+8+ □ + □ +600+30+40+53+65+17+600 = 2015; the equation 1+1+600+8+ □ + □ +600+ 30+40+68+65+36+600 = 2049; and the equation 1+1+600+8+ □ + □ +600+30+40+69+65+ 37+600 = 2051. The two empty boxes represent the N number-terms in First Nephi. All M number-terms in $Nephi_1$'s writings are assumed to imply definite quantification. The M number-

term in First Nephi provides a single number 1. The M number-terms in Second Nephi again are interpreted to provide: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death.

Set-contexts. The Set-sum representing 2013 days suggests a close accord with the length of 74 mean draconic months (about 2013.704 days). The Set-sum 2015 implies two Set-contexts: a close accord with the length 155 13-day cycles (13x155 = 2015) and a near accord with the length of 74 mean draconic months. The Set-sum 2049 suggests a close accord with the length of 75 mean sidereal months (about 2049.125 days). The Set-sum 2051 implies two Set-contexts: a close accord with the length of 293 7-day weeks (7x293 = 2051) and a near accord with the length of 75 mean sidereal months.

3.4.6 The Set with Set-contexts of 1960, 1962, and 1964 days

Set definition. The fifth proposed Set of $Nephi_1$'s combined major divisions contains both referenced cardinal or N number-terms and the eight K and L number-terms. The N number-terms each contribute the alternative numbers 8, 9, and 10.

Set and Set-sum illustration. This Set of number-terms and its alternative values for the N number-terms may be depicted by the equation 1+ □ +600+8+8+8+600+30+40+ □ +65+ □ +600 = 1960, the equation 1+ □ +600+8+9+9+600+30+40+ □ +65+ □ +600 = 1962, and the equation 1+ □ +600+8+10+10+600+30+40+ □ +65+ □ +600 = 1964. The three empty boxes represent the M number-terms in First and Second Nephi.

Set-contexts. The Set-sum 1960 suggests three Set-contexts: close accords with the lengths of 280 7-day weeks (7x280 = 1960), 98 20-day cycles (20x98 = 1960), and 72 mean draconic months (about 1959.28 days). The Set-sum 1962 implies two Set-contexts: a close accord with the length of 218 9-day cycles (9x218 = 1962) and a near accord with the length of 66.5 mean synodic months (about 1963.784 days). The Set-sum representing 1965 days suggests a close accord with the length of 66.5 mean synodic months.

3.4.7 The Set with Set-contexts of 1961, 1963, and 1965 days

Set definition. The sixth proposed Set is composed of the referenced M and N number-terms in First Nephi, plus the eight K and L number-terms. This Set differs from the previous proposed Set in that this one contains the quantitative meaning of "that same". Again, the N number-terms each contribute the alternative numbers 8, 9, and 10.

Set and Set-sum illustration. This Set of number-terms and its value for the M number-term and alternative values for the N number-terms may be depicted by the equation 1+1+600+8+8+8+600+30+40+ □ +65+ □ +600 = 1961, the equation 1+1+600+8+9+9+600+30+40+ □ +65+ □ +600 = 1963, and the equation 1+1+600+8+10+10+600+30+40+ □ +65+ □ +600 = 1965. The two empty boxes in each equation represent the M number-terms in Second Nephi.

Set-contexts. The Set-sum 1961 suggests a near accord with 72 mean draconic months (about 1959.28 days). The Set-sum 1963 implies two Set-contexts: close accords with the lengths of 151 13-day cycles (13x151 = 1963) and 66.5 mean synodic months (about 1963.784 days). The Set-sum 1965 suggests a near accord with the length of 66.5 mean synodic months.

3.4.8 The Set with Set-contexts of 2028, 2030, 2032, 2034, 2064, 2066, 2068, and 2070 days

Set definition. For this seventh proposed Set, the referenced ordinal or M number-terms in Second Nephi are added to the Set described in Section 3.4.6. The two N number-terms each contribute the alternative numbers 8, 9, and 10. The two M number-terms in Second Nephi again provide: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death.

Set and Set-sum illustration. This Set of number-terms may be symbolized by the equation 1+ □ +600+8+8+8+600+30+40+52+65+16+600 = 2028, the equation 1+ □ +600+8+9+9+600+30+40+52+65+16+600 = 2030, the equation 1+ □ +600+8+10+10+600+30+40+52+65+16+600 = 2032, the equation 1+ □ +600+8+8+8+600+30+40+53+65+17+600 = 2030, the equation 1+ □ +600+8+9+9+600+30+40+53+65+17+600 = 2032, the equation 1+ □ +600+8+10+10+600+30+40+53+65+17+600 = 2034, the equation 1+ □ +600+8+8+8+600+30+40+68+65+36+600 = 2064, the equation 1+ □ +600+8+9+9+600+30+40+68+65+36+600 = 2066, the equation 1+ □ +600+8+10+10+600+30+40+68+65+36+600 = 2068, the equation 1+ □ +600+8+8+8+600+30+40+69+65+37+600 = 2066, the equation 1+ □ +600+8+9+9+600+30+40+69+65+ 37+600 = 2068, and the equation 1+ □ +600+8+10+10+600+30+40+69+65+37+600 = 2070. The empty box in each equation represents the single M number-term in First Nephi.

Set-contexts. The Set-sum 2028 implies three Set-contexts: close accords with the lengths of 156 13-day cycles (13x156 = 2028), 74.5 mean draconic months (about 2027.31 days), and 17.5 mean synodic periods of Mercury (about 2027.857 days). The Set-sum 2030 suggests a single close accord with the length of 290 7-day weeks (7x290 = 2030). The Set-sum 2032 does not imply a near or close accord with any interval listed in Table 3.A. The Set-sum 2034 suggests two Set-contexts: a close accord with 226 9-day cycles (9x226 = 2034) and a near accord with 74.5 mean sidereal months (about 2035.464 days). The Set-sum 2064 suggests a near accord with 75.5 mean sidereal months (about 2062.785 days) and, perhaps, a close accord with half of a Jupiter SESI (about 2063.9 days). The Set-sum 2066 suggests two Set-contexts: near accords with the lengths of 70 mean synodic months (about 2067.141 days) and 23.5 mean sidereal periods of Mercury (about 2067.281 days). The Set-sum 2068 implies three Set-contexts: close accords with the lengths of 70 mean synodic months, 23.5 mean sidereal periods of Mercury, and 76 mean draconic months (about 2068.129 days). The Set-sum 2070 suggests three Set-contexts: close accords with the lengths of 230 9-day cycles and 69 30-day cycles (9x230 = 30x69 = 2070) and a near accord with 76 mean draconic months.

3.4.9 The Set with Set-contexts of 2029, 2031, 2033, 2035, 2065, 2067, 2069, and 2071 days

Set definition. For the eighth proposed Set of $Nephi_1$'s combined major divisions, every stated and referenced number-term is included. The M number-term in First Nephi supplies the number 1. The two N number-terms in First Nephi each contribute the alternative numbers 8, 9, and 10. The two M number-terms in Second Nephi again supply: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death.

Set and Set-sum illustration. This proposed Set of number-terms may be depicted by the equation 1+1+600+8+8+8+600+30+40+52+65+16+600 = 2029, the equation 1+1+600+8+9+9+600+30+40+52+65+16+600 = 2031, the equation 1+1+600+8+10+10+600+30+40+52+65+16+600 = 2033, the equation 1+1+600+8+8+8+600+30+40+53+65+17+600 = 2031, the equation 1+1+600+8+9+9+600+30+40+53+65+17+600 = 2033, the equation 1+1+600+8+10+10+600+30+40+53+65+17+600 = 2035, the equation 1+1+600+8+8+8+600+30+40+68+65+36+600 = 2065, the equation 1+1+600+8+9+9+600+30+40+68+65+36+600 = 2067, the equation 1+1+600+8+10+10+600+30+40+68+65+36+600 = 2069, the equation 1+1+600+8+8+8+600+30+40+69+65+37+600 = 2067, the equation 1+1+600+8+9+9+600+30+40+69+65+37+600 = 2069, and the equation 1+1+600+8+10+10+600+30+40+69+65+37+600 = 2071.

Set-contexts. The Set-sum 2029 implies two Set-contexts: near accords with the lengths of 74.5 mean draconic months (about 2027.31 days) and 17.5 mean synodic periods of Mercury (about 2027.857 days). The Set-sums 2031 and 2033 do not suggest a near or close accord with any interval listed in Table 3.A. The Set-sum 2035 implies a close accord with the length of 74.5 mean sidereal months (about 2035.464 days). The Set-sum 2065 suggests a close accord with the length of 295 7-day weeks (7x295 = 2065). The Set-sum 2067 implies four Set-contexts: close accords with the lengths of 159 13-day cycles (13x159 = 2067), 70 mean synodic months (about 2067.141 days), and 23.5 mean sidereal periods of Mercury (about 2067.281 days) and a near accord with the length of 76 mean draconic months (about 2068.129 days). The Set-sum 2069 suggests three Set-contexts: near accords with the lengths of 70 mean synodic months and 23.5 mean sidereal periods of Mercury and a close accord with the length of 76 mean draconic months. The Set-sum 2071 does not suggest a near or close accord with any of the intervals listed in Table 3.A.

3.4.10 The Set with a Set-context of 1266 days

Set definition. The next two proposed Sets in $Nephi_1$'s combined books sort the stated number-terms by their associated narrative-links. The ninth proposed Set consists of the four K and L number-terms associated with prepositional or Q narrative-links. The L number-terms associated with adverbial and verbal (U and R) narrative-links are excluded from this Set. All referenced (M and N) number-terms are deemed to be quantitatively indefinite; so, they are also excluded from this Set.

Set and Set-sum illustration. This ninth Set and its Set-sum may be represented by the equation 1+ □ + □ + □ + □ + □ + 600+ □ + □ + □ +65+ □ +600 = 1266. The nine empty boxes represent all referenced number-terms, plus the stated number-terms associated with U and R narrative-links.

Set-context. A single Set-context is implied by the Set-sum 1266: a close accord with the length of 46.5 mean draconic months or 93 mean half-draconic months (about 1265.368 days).

3.4.11 The Set with a Set-context of 678 days

Set definition. The tenth proposed Set consists of the four L number-terms associated with adverbial and verbal (U and R) narrative-links. The K and L number-terms associated with Q narrative-links are excluded from this Set, as are all the referenced (M and N) number-terms.

Set and Set-sum illustration. This tenth Set and its Set-sum may be symbolized by the equation □ + □ +600+8+ □ + □ + □ +30+40+ □ + □ + □ + □ = 678. The nine empty boxes in this

equation represent all referenced number-terms, plus the stated number-terms associated with Q narrative-links.

Set-context. A single Set-context is suggested by the Set-sum 678: a near accord with the length of 23 mean synodic months (about 679.204 days).

3.4.12 The Set with Set-contexts of 1830 days

Set definition. The next eight proposed Sets in $Nephi_1$'s combined books sort the stated number-terms by their associated time-terms. The 11th proposed Set in $Nephi_1$'s combined major divisions contains the four stated cardinal or L number-terms that are associated with personalized or G time-terms. This Set excludes the stated ordinal or K number-term, the three stated cardinal or L number-terms associated with omitted or H time-terms, and all referenced or M and N number-terms.

Set and Set-sum illustration. This Set of stated number-terms may be depicted by the equation □ + □ +600+ □ + □ + □ + 600+30+ □ + □ + □ + □ +600 = 1830. The nine empty boxes represent all K, M, and N number-terms, plus the three L number-terms associated with H time-terms.

Set-contexts. The Set-sum 1830 suggests close accords with the lengths of 61 30-day cycles (30x61 = 1830), 62 mean synodic months (about 1830.897 days), and 67 mean sidereal months (about 1830.551 days). The Set-sum 1830 also may be interpreted as suggesting the calendrical statement depicted by the equation (365x5) +5 = 1830. This is the seventh of the eight proposed Set-sums apparently composed by $Nephi_1$ to distinguish Egyptian and Mesoamerican 365-day calendars.

3.4.13 The Set with Set-contexts of 1831 days

Set definition. The 12th proposed Set in $Nephi_1$'s combined books includes all K and L number-terms that are associated with G time-terms. This Set excludes all referenced (M and N) number-terms and the three L number-terms that are associated with omitted or H time-terms.

Set and Set-sum illustration. This Set consists of five stated number-terms, as represented in the equation 1+ □ +600+ □ + □ + □ +600+30+ □ + □ + □ + □ +600 = 1831. The eight empty boxes represent all M and N number-terms and three L number-terms that are associated with H time-terms.

Set-contexts. The Set-sum 1831 implies close accords with the lengths of 62 mean synodic months (about 1830.897 days) and 67 mean sidereal months (about 1830.551 days).

3.4.14 The Set with Set-contexts of 1898, 1900, 1934, and 1936 days

Set definition. The 13th proposed Set in $Nephi_1$'s combined major divisions contains all L and M number-terms that are associated with G time-terms. The two M number-terms in Second Nephi again provide: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death. This Set excludes the K number-term and all L, M, and N number-terms that are associated with omitted or H time-terms.

Set and Set-sum illustration. This Set consists of six L and M number-terms, as depicted in the equation □ + □ +600+ □ + □ + □ +600+30+ □ +52+ □ +16+600 = 1898, the equation □ + □

+600+ □ + □ + □ +600+30+ □ +53+ □ +17+600 = 1900, the equation □ + □ +600+ □ + □ + □ +600+30+ □ +68+ □ +36+600 = 1934, and the equation □ + □ +600+ □ + □ + □ +600+30+ □ +69+ □ +37+600 = 1936. The seven empty boxes in each equation represent the K number-term, which is associated with a G time-term, and all L, M, and N number-terms that are associated with H time-terms.

Set-contexts. The Set-sum 1898 implies two Set-contexts: close accords with the lengths of 146 13-day cycles (13x146 = 1898) and 69.5 mean sidereal months (about 1898.855 days). This Set-sum also provides the eighth of the eight proposed Set-sums apparently composed by $Nephi_1$ to distinguish Egyptian and Mesoamerican 365-day calendars. The suggested calendrical statement may be represented by the equation (365x5) +73 = 1898. The Set-sum 1900 also implies two Set-contexts: a close accord with the length of 95 20-day cycles (20x95 = 1900) and a near accord with the length of 69.5 mean sidereal months. The Set-sum 1934 suggests three Set-contexts: near accords with the lengths of 71 mean draconic months (about 1932.068 days) and 22 mean sidereal periods of Mercury (about 1935.327 days) and a close accord with the length of 65.5 mean synodic months (about 1934.254 days). The Set-sum 1936 implies another two Set-contexts: a near accord with the length of 65.5 mean synodic months and a close accord with the length of 22 mean sidereal periods of Mercury.

3.4.15 The Set with Set-contexts of 1899, 1901, 1935, and 1937 days

Set definition. The 14th proposed Set in $Nephi_1$'s combined books includes all K, L, and M number-terms that are associated with G time-terms. The two M number-terms in Second Nephi again provide: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death. This Set excludes all L, M, and N number-terms that are associated with omitted or H time-terms.

Set and Set-sum illustration. This Set consists of seven K, L, and M number-terms, as represented in the equation 1+ □ +600+ □ + □ + □ +600+30+ □ +52+ □ +16+600 = 1899, the equation 1+ □ +600+ □ + □ + □ +600+30+ □ +53+ □ +17+600 = 1901, the equation 1+ □ +600+ □ + □ + □ +600+30+ □ +68+ □ +36+600 = 1935, and the equation 1+ □ +600+ □ + □ + □ +600+30+ □ +69+ □ +37+600 = 1937. The six empty boxes in each equation represent all L, M, and N number-terms that are associated with H time-terms.

Set-contexts. The Set-sum 1899 implies two Set-contexts: close accords with the lengths of 211 9-day cycles (9x211 = 1899) and 69.5 mean sidereal months (about 1898.855 days). The Set-sum 1901 does not imply a near or close accord with any interval listed in Table 3.A. The Set-sum 1935 suggests three Set-contexts: close accords with the lengths of 215 9-day cycles (9x215 = 1935), 65.5 mean synodic months (about 1934.254 days), and 22 mean sidereal periods of Mercury (about 1935.327 days). The Set-sum 1937 implies two Set-contexts: a close accord with the length of 149 13-day cycles (13x149 = 1937) and a near accord with the length of 22 mean sidereal periods of Mercury.

3.4.16 The Set with a Set-contexts of 113 days

Set definition. The 15th proposed Set in $Nephi_1$'s combined major divisions contains all L number-terms that are associated with omitted or H time-terms.

Set and Set-sum illustration. This Set consists of three L number-terms, as depicted in the equation □ + □ + □ +8+ □ + □ + □ + □ +40+ □ +65+ □ + □ = 113. The ten empty boxes represent all K, L, M, and N number-terms that are associated with G time-terms, plus a single M number-term, "that same", which is associated with an H time-term.

Set-contexts. The Set-sum 113 suggests a close accord with the length of one-half of a mean sidereal period of Venus (about 112.351 days). This Set-sum may also imply an observable part (113x19 = 2147) of six Mercury SESI (about 2146.8 days) and an observable part (113x50 = 5650) of eight Mars LESI (about 5650.4 days), both of which are intervals listed in Tables 3.A and 3.B.

3.4.17 The Set with Set-contexts of 114 days

Set definition. The 16th proposed Set combines all L and M number-terms that are associated with omitted or H time-terms. The M number-term supplies the number 1.

Set and Set-sum illustration. This Set consists of three L number-terms and one M number-term, as depicted in the equation □ +1+ □ +8+ □ + □ + □ + □ +40+ □ +65+ □ + □ = 114. The nine empty boxes represent all K, L, M, and N number-terms that are associated with G time-terms.

Set-contexts. The Set-sum 114 implies two near accords with the lengths of one-half of a mean sidereal period of Venus (about 112.351 days) and one mean synodic period of Mercury (about 115.878 days). In addition, this Set-sum may suggest an observable part (114x38 = 4332) of a single sidereal period of Jupiter (about 4332.849 days).

3.4.18 The Set with Set-contexts of 129, 131, and 133 days

Set definition. The 17th proposed Set in $Nephi_1$'s combined books includes all L and N number-terms that are associated with omitted or H time-terms. The two N number-terms each contribute the alternative numbers 8, 9, and 10.

Set and Set-sum illustration. This Set consists of three L number-terms and two N number-terms, as depicted in the equation □ + □ + □ +8+8+8+ □ + □ +40+ □ +65+ □ + □ = 129, the equation □ + □ + □ +8+9+9+ □ + □ +40+ □ +65+ □ + □ = 131, and the equation □ + □ + □ +8+ 10+10+ □ + □ +40+ □ +65+ □ + □ = 133. The eight empty boxes in each equation represent all K, L, and M number-terms that are associated with G time-terms, plus a single M number-term, "that same", which is associated with an H time-term.

Set-contexts. The Set-sum 129 may imply an observable part (129x32 = 4128) of a single Jupiter SESI (about 4127.8 days). The Set-sum 131 implies two Set-contexts: a near accord with the length of 4.5 mean synodic months (about 132.888 days) and a close accord with the length of 1.5 mean sidereal periods of Mercury (about 131.954 days). The Set-sum 133 suggests five Set-contexts: close accords with the lengths of 19 7-day weeks (7x19 = 133) and 4.5 mean synodic months, a near accord with the length of 1.5 mean sidereal periods of Mercury, an observable part (133x4 = 532) of an 18-month year (about 531.551 days), and an observable part (133x3 = 399) of a synodic period of Jupiter (about 398.884 days).

3.4.19 The Set with Set-contexts of 130, 132, and 134 days

Set definition. The 18th proposed Set in $Nephi_1$'s combined major divisions contains all L, M, and N number-terms that are associated with omitted or H time-terms. The M number-term in First Nephi supplies the number 1. The two N number-terms each contribute the alternative numbers 8, 9, and 10.

Set and Set-sum illustration. This Set consists of three L number-terms, one M number-term, and two N number-terms, as symbolized in the equation □ +1+ □ +8+8+8+ □ + □ +40+ □ +65+ □ + □ = 130, the equation □ +1+ □ +8+9+9+ □ + □ +40+ □ +65+ □ + □ = 132, and the equation □ +1+ □ +8+ 10+10+ □ + □ +40+ □ +65+ □ + □ = 134. The seven empty boxes in each equation represent all K, L, and M number-terms that are associated with G time-terms.

Set-contexts. The Set-sum 130 suggests three Set-contexts: close accords with the lengths of 10 13-day cycles (13x10 = 130) and one-half of a 260-day sacred calendar (130 days), and a near accord with the length of 1.5 mean sidereal periods of Mercury (about 131.954 days). This Set-sum also may imply an observable part (130x6 = 780) of a synodic period of Mars (about 779.937 days). The Set-sum 132 implies two Set-contexts: close accords with the lengths of 4.5 mean synodic months (about 132.888 days) and 1.5 mean sidereal periods of Mercury. The Set-sum 134 suggests a near accord with the length of 4.5 mean synodic months.

3.4.20 The Set with Set-contexts of 70, 72, 106, and 108 days

Set definition. The last two proposed Sets are sorted on the basis of year-terms. The 19th proposed Set in $Nephi_1$'s combined books includes all stated and referenced ordinal (K and M) number-terms, which only occur with express singular or A year-terms. The M number-term in First Nephi supplies the number 1. The two M number-terms in Second Nephi provide: 52nd or 53rd for the regnal year of Uzziah's death and 16th or 17th for the regnal year of Ahaz's death; and 68th or 69th for the "age" year of Uzziah's death and 36th or 37th for the "age" year of Ahaz's death.

Set and Set-sum illustration. This Set consists of four K and M number-terms, as represented in the equation 1+1 + □ + □ + □ + □ + □ + □ + □ +52+ □ +16+ □ = 70, the equation 1+1 + □ + □ + □ + □ + □ + □ + □ +53+ □ +17+ □ = 72, the equation 1+1 + □ + □ + □ + □ + □ + □ + □ +68+ □ +36+ □ = 106, and the equation 1+1 + □ + □ + □ + □ + □ + □ + □ +69+ □ +37+ □ = 108. The nine empty boxes in each equation represent all L and N number-terms that are associated with express plural or B year-terms.

Set-contexts. The Set-sum 70 implies a close accord with the length of 10 7-day weeks (7x10 = 70) and near accords with the lengths of 2.5 mean draconic months (about 68.031 days) and 2.5 mean sidereal months (about 68.304 days). The Set-sum 72 suggests a close accord with the length of 8 9-day cycles (9x8 = 72) and a near accord with the length of 2.5 mean synodic months (about 73.826 days). This Set-sum also may imply an observable part (72x5 = 360) of a 360-day calendar year. The Set-sum 106 does not imply a near or close accord with any interval listed in Table 3.A; however, it may suggest an observable part (106x5 = 530) of an 18-month year (about 531.551 days). The Set-sum 108 suggests three Set-contexts: close accords with the lengths of 12 9-day cycles (9x12 = 108) and 4 mean draconic months (about 108.849 days), and a near accord with the length of 4 mean sidereal months (about 109.287 days).

3.4.21 The Set with Set-contexts of 1959, 1961, and 1963 days

Set definition. The 20th proposed Set in Nephi$_1$'s combined major divisions contains all stated and referenced cardinal (L and N) number-terms, which only occur with express plural or B year-terms. The two N number-terms each contribute the alternative numbers 8, 9, and 10.

Set and Set-sum illustration. The seven L number-terms and two N number-terms of this proposed Set may be depicted by the equation □ + □ +600+8+8+8+600+30+40+ □ +65+ □ +600 = 1959, the equation □ + □ +600+8+9+9+600+30+40+ □ +65+ □ +600 = 1961, and the equation □ + □ +600+8+10+10+600+30+40+ □ +65+ □ +600 = 1963. The four empty boxes represent all stated and referenced ordinal (K and M) number-terms, which only occur with express singular or A year-terms.

Set-contexts. The Set-sum 1959 suggests a single Set-context: a close accord with the length of 72 mean draconic months (about 1959.28 days). The Set-sum 1961 implies a near accord with the length of 72 mean draconic months. The Set-sum 1963 suggests two Set-contexts: close accords with the lengths of 151 13-day cycles (13x151 = 1963) and 66.5 mean synodic months (about 1963.784 days).

3.4.22 Lunar symbolism of the number-terms in Nephi$_1$'s combined books

Eighteen of the 20 Sets listed above and 45 of their possible 57 Set-sums may be combined to suggest Nephite attention to the distinct lengths of draconic, sidereal, and synodic months. These lunar Set-contexts again suggest a concern with observing, tracking, and measuring draconic months or half-draconic months within the contexts of slightly longer sidereal months or half-sidereal months and synodic or half-synodic months. Table 3.E lists all 57 Set-sums as numbers of natural days and identifies the Set-sums that imply the lunar symbolism in Nephi$_1$'s combined books. These Set-sums and their Set-contexts also seem to depict clear temporal separations of the lengths of draconic, sidereal, and synodic months. The following list compares the "Set-context" means of draconic months suggested by the Set-sums and alternating periods of whole natural days (the implied close accords) with the modern estimates of these means (expressed with fractional days).

Month type	Close accords	Implied mean	Modern mean	Difference
draconic	68 or 69 days	27.4 days	27.21222 days	270.4 minutes
draconic	108 or 109 days	27.125 days	27.21222 days	125.6 minutes
draconic	1265 or 1266 days	27.21505 days	27.21222 days	4.1 minutes
draconic	1932 or 1933 days	27.21831 days	27.21222 days	8.8 minutes
draconic	1945 or 1946 days	27.20979 days	27.21222 days	3.5 minutes
draconic	1959 or 1960 days	27.21528 days	27.21222 days	4.4 minutes
draconic	2013 or 2014 days	27.20946 days	27.21222 days	4.0 minutes
draconic	2027 or 2028 days	27.21477 days	27.21222 days	3.7 minutes
draconic	2068 or 2069 days	27.21711 days	27.21222 days	7.0 minutes

For sidereal months, the implied means and their comparisons with modern estimates are the following.

Month type	Close accords	Implied mean	Modern mean	Difference
sidereal	68 or 69 days	27.4 days	27.32166 days	112.8 minutes
sidereal	1830 or 1831 days	27.3209 days	27.32166 days	1.1 minutes

Month type	Close accords	Implied mean	Modern mean	Difference
sidereal	1898 or 1899 days	27.31655 days	27.32166 days	7.4 minutes
sidereal	2035 or 2036 days	27.32215 days	27.32166 days	42.3 seconds
sidereal	2049 or 2050 days	27.32667 days	27.32166 days	7.2 minutes
sidereal	2062 or 2063 days	27.31788 days	27.32166 days	5.4 minutes

For synodic months, the implied means and their comparisons with modern estimates are the following.

Month type	Close accords	Implied mean	Modern mean	Difference
synodic	73 or 74 days	29.4 days	29.53059 days	64.0 minutes
synodic	132 or 133 days	29.44444 days	29.53059 days	124.1 minutes
synodic	531 or 532 days	29.52778 days	29.53059 days	4.0 minutes
synodic	679 or 680 days	29.54348 days	29.53059 days	18.6 minutes
synodic	1830 or 1831 days	29.52419 days	29.53059 days	9.2 minutes
synodic	1934 or 1935 days	29.53435 days	29.53059 days	5.4 minutes
synodic	1963 or 1964 days	29.52632 days	29.53059 days	8.3 minutes
synodic	2067 or 2068 days	29.53571 days	29.53059 days	7.4 minutes

Once more, these comparisons do not always suggest that the larger the number of days associated with a close accord, the more accurate the implied mean length of the month will be. When draconic months are measured with 1945 or 1946 days, the implied mean is 3.5 minutes less than the modern estimate, but when draconic months are measured with 2068 or 2069 days, the implied mean is 7.0 minutes more than the modern estimate. When sidereal months are measured with 1830 or 1831 days, the implied mean is 1.1 minutes less than the modern estimate, but when sidereal months are measured with 2062 or 2063 days, the implied mean is 5.4 minutes less than the modern estimate. Likewise, when synodic months are measured with 531 or 532 days, the implied mean is 4.0 minutes more than the modern estimate, but when synodic months are measured with 1963 or 1964 days, the implied mean is 8.3 minutes less than the modern estimate. These lunar data also may suggest that Nephite observers preferred the accuracy of longer measurements of natural days that reached close accords with observed astronomical events, but they may have been aware that some shorter measurements were the more accurate ones. Presumably, they sought to find the most accurate astronomical accords to improve the precision of their records and predictions.

Twelve Sets and 19 Set-sums suggest the close accords that may be associated with seven synodic month intervals. These intervals include 2.5 synodic months (73-74 days), 4.5 synodic months (132-133 days), 23 synodic months (679-680 days), 62 synodic months (1830-1831 days), 65.5 synodic months (1934-1935 days), 66.5 synodic months (1963-1964 days), and 70 synodic months (2067-2068 days). These implied data and their comparisons with modern estimates are listed above. The synodic month symbolism may suggest, again, that $Nephi_1$ and his people were devotedly observing synodic months. In that regard, one cannot help noting in the Set-contexts related to 1830 and 1831 days that a close accord of the lengths of synodic and sidereal months occurs. Sixty-two mean synodic months (about 1830.897 days) is almost the same length as 67 mean sidereal months (about 1830.551 days). The difference in the two intervals is about 8 hours and 18.2 minutes. This particular accord also may suggest that since a 12-month synodic calendar repeats predictably (the mean is about 354.367 days), the observers at some point relatively early in their journey or voyage may have noted that the moon returned to approximately the same position in the fixed stars 13 times in 12 synodic months (the related

sidereal year is about 355.182 days). The difference in these intervals is about 19 hours and 33.6 minutes. Such an early, but generalized attention to moon, stars, and simple counts of 12 and 13 could have provided an astronomical foundation for more careful observations and record keeping regarding sidereal months, draconic months, fixed stars, the sun, and agricultural seasons once the people of Nephi became settled.

3.4.23 Symbolic amplifications

Table 3.E includes 7 Sets and 15 proposed Set-sums that may be related to observation of the synodic and sidereal periods of Mercury. The following list compares the "Set-context" means of such periods suggested by the Set-sums and alternating periods of whole natural days (the implied close accords) with the modern estimates of these means (expressed with fractional days).

Period type	Close accords	Implied mean	Modern mean	Difference
sidereal	131 or 132 days	87.66667 days	87.96939 days	435.9 minutes
sidereal	1935 or 1936 days	87.97727 days	87.96939 days	11.3 minutes
sidereal	2067 or 2068 days	87.97872 days	87.96939 days	13.4 minutes
synodic	115 or 116 days	115.5 days	115.87754 days	543.7 minutes
synodic	2027 or 2028 days	115.85714 days	115.87754 days	29.4 minutes

The proposed close accords of 1.5 Mercury sidereal periods (131-132 days) overlap with the close accords suggested for 4.5 synodic months (132-133 days). The proposed close accords of 22 Mercury sidereal periods (1935-1936 days) overlap with the close accords suggested for 65.5 synodic months (1934-1935 days). The proposed close accords of 23.5 Mercury sidereal periods (2067-2068 days) are the same as the close accords suggested for 70 synodic months and overlap with the close accords suggested for 76 draconic months (2068-2069 days). The proposed close accords of a single Mercury synodic period (115-116 days) are a few days less than the close accords of 4 synodic months (118-119 days), but the proposed close accords of 17.5 Mercury synodic periods (2027-2028 days) are ten days less than the close accords of 69 synodic months (2037-2038 days). For Mercury sidereal periods, the suggestion might be that the observers were noting accords with the lengths of synodic months, but that suggestion seems inapplicable to Mercury synodic periods and synodic months.

As Tables 3.C, 3.D, and 3.E also indicate, near and close accords may be implied for: 2.5, 29.5, 44.5, 46.5, 71.5, and 74.5 draconic months; 2.5, 29.5, 69.5, 74.5, and 75.5 sidereal months; 2.5, 4.5, 41.5, 65.5, and 66.5 synodic months; 1.5, 23.5 Mercury sidereal periods; 17.5 Mercury synodic periods; and 0.5 Venus sidereal periods. The implied periods of half-draconic and half-sidereal months and half-sidereal periods of Mercury and Venus may suggest that Nephite observers were aware of more than the movements of the moon or a planet past a single point in the fixed stars. They may have been aware of constellations of fixed stars and they apparently tracked the movements of bright planets and the moon along their paths through the constellations. Similarly, the implied periods of half-synodic months and half-synodic periods of Mercury also suggest an awareness of the movements of the moon, planets, and sun through the constellations.

Calendrical notes may be added regarding the symbolism suggested by the Set-sums 1830, 1898, and 2048. The calendrical symbolism of the Set-sum 1830 is similar to that of the Set-sum 1200 in First Nephi and the duplicate Set-sums 735 in Second Nephi. In each instance, a Set-

context may be proposed in which a number of 365-day years occur, followed by a year that begins with a 5-day epagomenal period. The suggested equations are (365x3) +105 = 1200, (365x2) +5 = 735, and (365x5) +5 = 1830. The symbolism seems identical: the represented 365-day calendar began each year with a 5-day epagomenal period instead of ending with such a period. $Nephi_1$ appears to have been comparing a Mesoamerican 365-day calendar, with its introductory 5-day period and terminal naming, to the Egyptian 365-day calendar, which apparently concluded with a 5-day period. Furthermore, the Set-sum 625 in First Nephi, which may be represented by the equation 365+260 = 625, may symbolize another Mesoamerican calendar, which, like the Egyptian 365-day calendar, concluded with the 5-day epagomenal period. Nonetheless, this New World calendar differed from the Egyptian one because the 365-day year was divided into a Mesoamerican 260-day period followed by a 105-day period.

The calendrical symbolism of the Set-sum 1898 is similar to that of the Set-sum 803 in Second Nephi. In both cases, a Set-context may be proposed in which a number of 365-day years occur, followed by a period of 73 days. The suggested equations are (365x2) +73 = 803 and (365x5) +73 = 1898. As discussed in Section 3.3.15, the number 73 appears to have been understood in Mesoamerica as a fifth part of the 365-day calendar (73x5 = 365) and as an eighth part of a close accord with the synodic period of Venus. As such, the number 73 may have been used for coordinating the solar year and synodic period of Venus, perhaps with seasonal agricultural and security connotations. Additionally, the number 73 was an integral aspect of the Calendar Round, which was composed of 52 365-day years or 73 260-day calendars (365x52 = 260x73 = 18980). Again, $Nephi_1$ seems to imply that his knowledge of the Egyptian 365-day calendar included nothing like these 73-based intervals.

The calendrical symbolism of the Set-sum 2048 suggests a longer close accord with the period of 2.5 819-day cycles (2047.7 days). This Set-sum is the fourth of the four Set-sums examined above that appear to document the existence of the 819-day cycle in $Nephi_1$'s writings. When combined with the shorter close accord of this cycle suggested by the Set-sum 1228 (discussed in Sections 3.2.6 and 3.2.20 above), the sum 3276 may represent four complete 819-day cycles. The combined interval of 3276 days suggests the equation 4x7x9x13 = 3276 and may be related to nine computing years: 364x9 = 3276. Mesoamericans appear to have tracked movements in time and space with four 819-day cycles, each of which was associated with one of their four principal colors and directions.[93] Moreover, when the Set-sum 2048 is combined with the longer close accord of this cycle suggested by the Set-sum 1229 (discussed in Sections 3.2.15 and 3.2.20 above), the sum 3277 may suggest the beginning day of another 3276-day cycle, i.e., the continuous cycling of four 819-day intervals.

To conclude this examination of number-term symbolism in $Nephi_1$'s major divisions, perhaps it is worthwhile to reiterate the conclusion in Part 1 of this Division, a conclusion based then only on the analysis of $Nephi_1$'s chronological structure. Rather than viewing $Nephi_1$'s writing process as merely extracting bits and pieces from his comprehensive history or from the brass plates, and then putting the extracts into a simple chronological order, it appears logical to view $Nephi_1$'s writings as having been carefully chosen and composed, and then placed within an intentional design. The choice of diction for each temporal-expression, the complexity of the

[93] Aveni, *Empires of Time*, 204-07; Berlin and Kelley, "The 819-day Count and Color-direction Symbolism among the Classic Maya", 9-20; Schele and Freidel, *A Forest of Kings*, 78, 83; Thompson, *Maya Hieroglyphic Writing: Introduction*, 212-17.

placement of temporal-expressions, and the purposes behind all these decisions seem most likely to have been planned precisely. Now, having examined the proposed symbolism of $Nephi_1$'s year-terms, time-terms, and narrative-links in Part 2 of this Division and the proposed symbolism of his number-terms in this Part, the Part 1 suggestion of $Nephi_1$'s precise planning appears to have been confirmed. However, only the first 17 number-terms in the small plates of Nephi have been analyzed for their symbolic significance and 12 more number-terms remain to be examined. Do the number-terms in the Book of Jacob imply symbolic Set-contexts similar to those proposed for $Nephi_1$'s writings? Yes, of course they do.

3.5 The Book of Jacob number-terms

Prior to $Mormon_2$ finding the small plates of Nephi among the official plates of Nephi and studying the express and implied messages of the small plates,[94] the last writers on these plates had been $Jacob_2$ and his descendants. They created the major divisions known as the books of Jacob, Enos, Jarom and Omni. $Jacob_2$'s role as guardian of the small plates of Nephi began when the 55th Lehi calendar year had ended and $Nephi_1$ made his final preparations for death. At that time, $Nephi_1$ not only delivered the small plates to $Jacob_2$, but he "commanded"[95] $Jacob_2$ regarding the additional content that $Jacob_2$ and his descendants should place on the plates.[96] Part of that required content apparently included the names of the successive guardians of the plates ($Jacob_2$ and his descendants) and their relationships to each other,[97] and the forms of the temporal-expressions they could use to record the passage of Lehi calendar years.[98] The chronological structure displayed in $Nephi_1$'s writings and in the writings of $Jacob_2$, his descendants, and $Mormon_2$ suggests that all this regulation of diction that could be predetermined was planned by $Nephi_1$.

$Jacob_2$ waited until late in his own life before inscribing anything on these plates,[99] which, to distinguish them from the official plates of Nephi kept by Nephite kings, had come to be known at least for a while as the "plates of Jacob".[100] For $Jacob_2$ and the priesthood he led, the small plates apparently served as an instruction manual[101] detailing the origins, Messianic revelations, and teachings of $Lehi_1$, $Nephi_1$, and the Nephite people. $Jacob_2$, after his acceptance of the guardianship of these plates and throughout the remainder of his life, appears to have identified and recorded information that he thought would fulfill $Nephi_1$'s "commandment"[102] regarding prophetic and ministerial content: his introduction to guardianship of the small plates and to priesthood leadership of the people;[103] the Nephite trend toward "hard … hearts", "pride", and "wicked practices" during "the reign of the second king";[104] $Jacob_2$'s speech to the people in

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[94] Words of Mormon 1:3-7.

[95] Jacob 7:27.

[96] Jacob 1:1-5.

[97] Jacob: title; title appositive; 7:27; Enos 1:1; Jarom 1:1, 15; Omni 1:1, 3-4, 8-10, 12, 25, 30.

[98] See Division 2, Parts 1-2.

[99] Jacob: introductory declaration.

[100] Jacob 3:14.

[101] 1 Nephi 19:3.

[102] Jacob 1:2, 8.

[103] Jacob 1:1-5.

[104] Apparently, Nephi third, since $Nephi_1$ refused the monarchy. 2 Nephi 5:18; Jacob 1:15-16.

the temple regarding such attitudes and practices;[105] his reminder to them of their role in the prophecy of Zenos, which he obtained in the brass plates, and his exhortation that they would fulfill their role;[106] his face-to-face confrontation with a challenger, Sherem;[107] and $Jacob_2$'s report of his ministry and purpose in engraving on the small plates.[108]

When $Jacob_2$'s book was finally composed, he included four temporal-expressions that followed $Nephi_1$'s examples and "commands",[109] presumably so as to give both chronological structure and symbolism to his addition to the small plates. The structure emphasized three periods: the time when $Nephi_1$ transferred the small plates and religious leadership of the Nephite people to $Jacob_2$; the remaining years of $Jacob_2$'s life when he devotedly taught the Nephite people to observe the law of Moses and look forward to the Messiah's mortal service; and the very end of $Jacob_2$'s life, when, with the help of God, he withstood the challenge of Sherem, preserved the small plates from destruction, and entrusted his young son, Enos, with guardianship of the plates.

The diction, language types, and positions of the four express number-terms composed by $Jacob_2$ occur in the following order:

1. "fifty and five", a stated cardinal or L number-term that concludes $Nephi_1$'s (LML) number-term letter-group;
2. "many hundred", a referenced cardinal or N number-term that creates $Jacob_2$'s (N) letter-set;
3. "some", another referenced cardinal or N number-term that is part of the same letter-set; and
4. "many hundred", $Jacob_2$'s final referenced cardinal or N number-term.

The number-term "fifty and five" occurs in a temporal-expression that may be described as an RBDL expression (see Table 2.A of this Division), the only one of such expressions to appear in the small plates of Nephi. The "many hundred" number-terms occur in RBGN expressions and the number-term "some" occurs in an RBHN expression. From the Book of Jacob through the Words of Mormon, every temporal-expression composed by a writer other than $Nephi_1$ uses a verbal or R narrative-link with an express plural or B year-term. The types of these additional temporal-expressions in the small plates of Nephi only differ in their use of time-terms (personalized or omitted) and/or number-terms (stated or referenced cardinal).

3.5.1 The 55-year interval

$Jacob_2$'s first number-term, "fifty and five",[110] is the only stated number-term in $Jacob_2$'s book. Based on the mean length of a synodic month, 55 12-month lunar years or 660 synodic months would be about 19,490.189 days. Except as an expression of synodic months, an interval

[105] Jacob 1:17-3:12.

[106] Jacob 5-6.

[107] Jacob 7:1-23.

[108] Jacob 4:1-7.

[109] Jacob 7:27.

[110] Jacob 1:1.

of 19490 or 19491 days does not suggest a near or close accord with the length of any astronomical or calendrical interval listed in Table 3.A.

3.5.2 The 500-year interval

$Jacob_2$'s two RBGN expressions have identical number-terms, "many hundred", which relate to the remaining time before the Messiah's prophesied birth. "[F]or this intent have we written these things", $Jacob_2$ writes, that "our beloved brethren and our children ... may know that we knew of Christ, and we had a hope of his glory many hundred years before his coming".[111] The referenced cardinal or N number-term includes the definite cardinal number "hundred". The definition of the determiner *many* in this phrase appears to be "[a] multitude, a plurality ... [o]pposed to *one*",[112] rather than "[n]umerous [or] comprising a great number"[113] $Jacob_2$ was born after $Lehi_1$ and Sariah left Jerusalem and during their initial eight-year sojourn in the wilderness;[114] so, it seems likely that, late in $Jacob_2$'s life, the time remaining in $Lehi_1$'s prophetic period would have been approaching 500 years. In this number-term, *many* apparently means "five" and the complete number-term refers to the cardinal number 500. In describing Sherem's challenge to $Jacob_2$'s religious leadership and Messianic prophecies, $Jacob_2$ appears to quote Sherem as saying, "[Y]e have led away much of this people … and convert the law of Moses into the worship of a being which ye say shall come many hundred years hence".[115] This N number-term also appears to refer to the approximately 500 years remaining before the prophesied birth. Hence, both of $Jacob_2$'s RBGN expressions seem to assume that at least 500 Lehi calendar years remained to be observed and recorded. The implication is that descendants of $Lehi_1$ had devotedly measured his 600-year prophecy for almost 100 years. Based on the mean length of a synodic month, 500 12-month lunar years or 6,000 synodic months would be about 177183.54 days. This interval may represent a close accord with a period of 9-day cycles (9x19687 = 177183).

When 100 years had occurred after $Lehi_1$'s departure from Jerusalem and 500 years of the 600-year prophecy still remained, $Jacob_2$ (if he were then alive) would have been about 92 to nearly 100 years of age, as measured with the 12-month lunar calendar that appears to have been used to measure the Lehi era context. In terms of a solar or tropical year, $Jacob_2$ would have been about 89 to 97 years of age. Presumably, Sherem's challenge occurred before the time of the 100-year anniversary because the repetition of the "many hundred" number-terms suggests that more than 500 years of $Lehi_1$'s prophetic period still remained when the challenge occurred. Hence, at the time of the challenge, $Jacob_2$ seems likely to have been in his late 80s or early 90s, as measured in terms of solar years.

3.5.3 The puzzling interval

$Jacob_2$'s third number-term, the one that he placed between the two "many hundred" number-terms, is the determiner *some*, which has been categorized as another referenced cardinal

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[111] Jacob 4:3-4.

[112] *The Compact Edition of the Oxford English Dictionary*, I: 1722 (many), italics in the original.

[113] Webster, *An American Dictionary of the English Language*, II: [97] (many).

[114] 1 Nephi 17:1-5; 18:7.

[115] Jacob 7:7.

or N number-term.[116] $Jacob_2$ stated that "some years had passed" when Sherem "began to preach among the people", to attack the "doctrine of Christ", to flatter the people into supporting his proposals, and to seek "much opportunity" to confront $Jacob_2$ directly and charge him with blasphemy.[117] The implication seems to be that such years existed after the 55th Lehi calendar year had expired, when $Jacob_2$ became the Nephites' religious leader and received the small plates that recorded the doctrine of Christ "for the instruction of [$Nephi_1$'s] people".[118] Sherem sought to "overthrow" that doctrine and, if he could have wrested the small plates and religious leadership from $Jacob_2$'s control, Sherem likely would have destroyed the plates.[119]

The determiner *some* appears to note "a number of ... things, greater or less, but indeterminate".[120] $Jacob_2$ does not expressly state the related cardinal number in the text of his book; so, the quantification of *some* may seem to be indeterminate. However, this number-term has been categorized as a referenced cardinal or N number-term,[121] rather than as a referenced general or O number-term that would be truly indeterminate. For the referenced cardinal number and enigmatic interval of years to be determined, the definite number represented by *some* apparently must be ascertained from implications of the text of the Book of Jacob. To determine such implications, the Sets, Set-sums, and Set-contexts of this book must be understood.

3.5.4 The Set with Set-contexts of 55 days

Set definition. Like $Nephi_1$'s Sets that were composed only of the stated number-terms in First Nephi and Second Nephi, the first proposed Set in the Book of Jacob is the only stated number-term in this major division. The stated cardinal or L number-term provides the cardinal number 55 as a complete Set and its related Set-sum.

Set and Set-sum illustration. Since a referenced number-term may or may not be viewed as contributing the definite number it implies to a particular Set, the N number-terms in $Jacob_2$'s major division all may be treated as being quantitatively indefinite and depicted as three empty boxes in the equation 55+ □ + □ + □ = 55.

Set-contexts. The Set-contexts suggested by the proposed Set-sum 55 may be described as close accords with the lengths of 2 mean draconic months (about 54.424 days) and 2 mean sidereal months (about 54.643 days).

3.5.5 The Set with a Set-context of 1055 days

Set definition. The second proposed Set in the Book of Jacob combines the three number-terms that occur in year-related expressions with express (D and G) time-terms. The diction of each of these number-terms includes at least one cardinal number name: *fifty* and *five*—many *hundred*—many *hundred* (italics added). The number-term "some" that is excluded from this Set has no cardinal number and its year-related expression has no time-term.

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[116] See Division 2, Part 1, Section 1.9.5 and Table 1.H.

[117] Jacob 7:1-7.

[118] 1 Nephi 19:3.

[119] Jacob 7:1-5.

[120] Webster, *An American Dictionary of the English Language*, II: [624] (some).

[121] See Division 2, Part 1, Section 1.9.5.

Set and Set-sum illustration. This proposed Set and Set-sum may be depicted by the equation 55+500+ □ +500 = 1055. The empty box in this equation represents the N number-term "some". The stated cardinal or L number-term that is associated with the long name or D time-term provides the number 55 to the Set. Each referenced cardinal or N number-term that is associated with a personalized or G time-term implies the number 500.

Set-context. The Set-sum 1055 suggests a single Set-context: a close accord with the length of 12 mean sidereal periods of Mercury (about 1055.633 days).

3.5.6 The Set with a Set-context of 1042 days

Set definition. In Part 1 of this Division, the suggestion was made that $Jacob_2$'s third number-term "some" should be categorized as a referenced cardinal or N number-term in order to maintain a final (NLN) number-term letter-group following $Nephi_1$'s concluding (LML) number-term letter-group. This structural proposal is still assumed to be correct, even though no text was identified in Part 1 as presenting or even suggesting the cardinal number that might be referenced by the determiner *some*.

This study now proposes that $Jacob_2$'s use of "some", as a representation of a definite cardinal number, may be understood only by taking into account the language types of the four number-terms in the Book of Jacob, the diction and central position of the number-term "some" in the three N number-terms, the omission of a time-term from $Jacob_2$'s third temporal-expression, and the Set-context implied by the proposed Set-sum 1055. Based on these interpretative factors, this study suggests a third Set composed of all three referenced cardinal or N number-terms in the Book of Jacob.

Set and Set-sum illustration. This Set and Set-sum may be represented initially by the equation □ +500+ *some* +500 = *X*. Again, each of the referenced cardinal or N number-terms that is associated with a personalized or G time-term implies the number 500. The empty box in this equation represents the stated cardinal or L number-term in the Book of Jacob. The years numbered by the L number-term describe an interval that occurred before $Jacob_2$ became religious leader of the Nephites and guardian of the small plates. Those years are excluded from this third proposed Set, which implies the number of $Jacob_2$'s years of religious leadership.

As to language types, the three referenced cardinal or N number-terms are clearly separated from the stated cardinal or L number-term in this book. As to diction, $Jacob_2$'s reference to "some" years creates a distinct contrast with the stated cardinal or L number-term "fifty and five". In addition, just as three number-terms each contained at least one definite cardinal number and produced the second proposed Set, the three N number terms each contain a general quantitative term ("many" or "some") and produce this third proposed Set. The number-term "some" also holds the central position in $Jacob_2$'s three N number-terms and that position may suggest that "some" is to be understood numerically and chronologically within the combination of 500+ *some* +500.

$Jacob_2$, by including a long name or D time-term in his first temporal-expression and omitting a time-term in his third temporal-expression, seems to suggest that "some" years were to be understood as a continuation of the Lehi calendar years that had been observed, measured, and expressly reported for 55 years. "[F]ifty and five" plus "some" years all had been experienced and then they "had passed", as their identical verbal or R narrative-links expressed. Thus, a Lehi era context and meaning appear to be suggested for $Jacob_2$'s "some" years.

A further implication of the foregoing interpretative factors seems to be that the period of "some" Lehi calendar years was designed to be understood fully or realized symbolically in relation not only to the first proposed Set, but also in relation to the second proposed Set. Stated cardinal numbers (the three number-terms of the second Set) are similar to, but distinctly different from, referenced cardinal numbers (the three number-terms of the third Set). For the second Set, the Set-sum 1055 suggested a Set-context of 1055 days or 12 mean sidereal periods of Mercury. In the proposed equation representing this third Set, the italicized capital letter *X* represents the as yet undetermined Set-sum. The determination or quantification of *X* apparently was intended to be implied by referring to the Set-context of the second Set. Since Mercury, like all the other bright planets visible to naked-eye observation, has both a sidereal period and a synodic period, and since the length of 12 sidereal periods of Mercury may be observed and computed as 1055 natural days, the implication seems to be that *X* symbolizes the corresponding measure of some number of synodic periods of Mercury.

Set-context. This study proposes that in their devoted observation of Lehi calendar years, $Nephi_1$ and his younger brothers, $Jacob_2$ and $Joseph_2$, and eventually other Nephite priest-astronomers studied the heavens and created records of their observations. Those astronomical records appear to have been available to $Jacob_2$ at the time he began to compose the final chronological structure of his book. Twelve sidereal periods of Mercury (1055 days) would have been known to be 12 or 13 days longer than 9 mean synodic periods of Mercury (about 1042.898 days). Nine synodic periods of Mercury may have been associated on a regular basis with a count of at least 1042 days, much like 12 sidereal periods of Mercury may have been associated with a count of at least 1055 days. Most likely, Nephite priests also would not have missed the fact that 1043 days is equivalent to 149 7-day weeks (7x149 = 1043); so, the 1043rd day would have been a seventh of Sabbath day of the 149th week. No other astronomical or calendrical interval listed in Table 3.A would have provided similar commensurations.

Thus, the third proposed Set and Set-sum of the Book of Jacob also may be represented by the equation □ +500+ *some* +500 = 1042. The Set-sum 1042 represents a shorter close accord with the Mercury synodic period, just as the Set-sum 1055 represents a shorter close accord with the Mercury sidereal period. Simple algebra may be used to delete 1000 from each side of the equation and the final depiction of the equation becomes □ + *some* = 42. In light of $Jacob_2$'s report that Sherem "came …among the people of Nephi", "began to preach", "labored diligently", "did lead away many hearts", and "sought much opportunity that he might come unto me", the chronological symbolism of the number-term "some" may be that Sherem began his labors to "overthrow the doctrine of Christ" prior to or in the 98th Lehi calendar year and his labors ended after his audience with $Jacob_2$ during the 98th Lehi calendar year, when 42 of such years "had passed" since $Jacob_2$ was appointed the Nephite religious leader.[122] This interpretation is consistent with $Jacob_2$'s initial report that 55 of such years "had passed" when he became the religious leader.

3.5.7 The 42-year interval

Forty-two Lehi calendar years or 504 mean synodic months is about 14883.417 days, an interval that suggests a near accord with the length of 547 mean draconic months (about

[122] Jacob 7:1-15.

14885.084 days). In addition, 42 Lehi calendar years is the equivalent of 28 18-month lunar years (12x42 = 18x28 = 504). At the time of Sherem's defeat, apparently during the 43rd Lehi calendar year, $Jacob_2$ would have been about 86 to 95 solar years of age.

3.5.8 The Set with Set-contexts of 42 days

Set definition. The referenced cardinal or N number-term "some" is the only number-term in the Book of Jacob with diction that does not include a cardinal number name. The temporal-expression that includes "some" is the only temporal-expression in the Book of Jacob that has been characterized with an omitted or H time-term. Hence, "some", meaning "forty and two" in diction similar to "fifty and five", is proposed as the fourth Set and Set-sum of this major division.

Set and Set-sum illustration. If empty box symbols are used to represent the number-terms that include at least one cardinal number and that are associated with express time-terms, this proposed Set and Set-sum may be depicted as □ + □ +42+ □ = 42.

Set-contexts. The Set-sum 42 implies two associated Set-contexts. The first is a close accord with the length of 6 7-day weeks (7x6 = 42). The second proposed Set-context is similar to 12 of the Set-contexts suggested for number-terms in $Nephi_1$'s writings. These 12 Set-contexts identified component parts of 365-day calendars, Venus synodic cycles, and 819-day cycles. In addition, it is similar to perhaps as many as 29 Set-contexts suggested for number-terms in $Nephi_1$'s writings, which appeared to identify observable parts of a 260-day divinatory calendar, a Long Count 360-day year, a 364-day computing year, an 18-month lunar year, and various periods of the five bright planets visible to naked eye observation.

In the Book of Jacob, the second Set-context of 42 days suggests a one-ninth component part of a 378-day synodic period of the planet Saturn (42x9 = 378). A single mean synodic period of Saturn is about 378.092 days. Thus, an interval of 54 7-day weeks or 42 9-day cycles usually provided a close accord with the length of the synodic period of Saturn. Perhaps the suggestion that the third Set in the Book of Jacob symbolizes a synodic period of Mercury should not be considered surprising in light of this fourth proposed Set and its Set-context related to a synodic period of Saturn. Indeed, the sidereal period of Mercury is the shortest sidereal period of the five bright planets (about 87.96939 days) and the sidereal period of Saturn is the longest of such periods (about 10764.44 days). It seems unlikely that all such astronomical information was unavailable to $Jacob_2$ when he composed his last three temporal-expressions.

3.5.9 The 97-year interval

Assuming that the number-term "some" implies the cardinal number 42, it becomes possible to create a combination of periods that reflects the total number of years that had elapsed in the Lehi era context when Sherem failed in his attempt to overthrow the doctrine of Christ. This combination may be represented by the equation 55+42 = 97. Based on the length of a mean synodic month, 97 12-month years or 1164 synodic months are about 34373.607 days. Except for synodic months, six-month semesters, and 12-month years, this interval of 34373 or 34374 days does not suggest a near or close accord with an astronomical period or calendrical cycle listed in Table 3.A of this Division. An interval of 34370 days (3 or 4 days shorter that 97 12-month years) may represent a close accord with the lengths of 1263 mean draconic months (about 34369.034 days) and 1258 mean sidereal months (about 34370.648 days). However, it would seem unlikely that such long sidereal and draconic month intervals would have been

observed, measured, and recorded by $Lehi_1$ and his descendants from the time of his hasty escape from Jerusalem until the time of Sherem's confrontation with $Jacob_2$ in the city of Nephi. While the combination 55+42 = 97 may evidence an interval of years that had passed in the Lehi era context, the combination is considered ancillary to $Jacob_2$'s symbolic purposes and is not proposed as another Set and Set-sum.

3.5.10 Other ancillary combinations

The cardinal numbers 42, 55, 500, 1000, 1042, and 1055 are the ones that seem tied most closely to the diction, language typology, placement patterns, and narratives associated with $Jacob_2$'s temporal-expressions. These numbers have all been employed above in defining the four proposed Sets of the Book of Jacob. There appear to be both linguistic and semantic reasons for proposing these cardinal numbers as intended elements of $Jacob_2$'s Sets. There are another four possible combinations of the four express number-terms (after excluding identical number combinations resulting from the duplication of the "many hundred" or 500 number-terms). These additional combinations are listed below.

500+42 = 542
500+55 = 555
500+55+42 = 597
500+500+55+42 = 1097

Such possibilities arise because abstract arithmetic operations do not require a narrative basis or other textual considerations. For example, the largest potential combination in the Book of Jacob (represented by the equation 500+500+55+42 = 1097) occurs because the four cardinal numbers appear to be stated or implied in the text and may be added to each other, not because there is any textual basis for asserting that $Jacob_2$ intended to describe an interval of 1097 days or years. Similar assertions may be made as well about the other possible combinations. They appear to be ancillary or incidental to $Jacob_2$'s narrative, structural, and symbolic purposes for creating his four temporal-expressions.

3.5.11 Symbolism of the Jacob number-terms

The close accords of the 55-day period with the lengths of 2 sidereal months and 2 draconic months are simple reminders of $Nephi_1$'s lunar symbolism. These close accords also may have been understood as one day more than 6 9-day cycles (9x6 = 54) and one day less than 8 7-day weeks (7x8 = 56). That is, an interval of 55 days, like $Nephi_1$ and $Jacob_2$ in person, may be viewed as a symbolic bridge between two record keeping cultures and their basic nightly chronological counts. Practically speaking, $Nephi_1$ had to survive into the 56th Lehi calendar year for all of such proposed symbolism to be possible. The extended symbolism appears to be that the initial number-term to appear in the Book of Jacob (55) was understood by $Nephi_1$ and $Jacob_2$ to be a part of $Nephi_1$'s "commands" prior to the delivery of the small plates to $Jacob_2$.

By creating the "fifty and five" and "some" number-terms, which are starkly dissimilar ways of describing elapsed time in the Lehi era context, $Jacob_2$ was able to specify the 55 years that had passed before he became the guardian of the small plates and to imply the following 42 years that had passed before the message of these plates and the plates themselves were saved from Sherem's intended destruction. Simultaneously, the distinctive number-terms "fifty and five" and "some" helped to symbolize the dissimilar sidereal and synodic periods of a single planet, Mercury. This proposed focus on Mercury's relatively short and difficult to measure periods

appears to be $Jacob_2$'s symbolic witness to the Nephite priest-astronomers' dedicated observation and measurement of the Lehi era context. By composing his third temporal-expression with a referenced cardinal or N number-term, $Jacob_2$ was able to maintain his (N) letter-set and thereby permit his son Enos to begin his use of number-terms with a fourth N number-term in this letter-set, the "many" years that Enos heard God speak in his revelation that Enos should take up the guardianship of the small plates. In other words, detailed planning of the chronological structure of $Jacob_2$'s book likely did not begin without $Nephi_1$'s involvement and did not end until $Jacob_2$'s number-terms were coordinated with the initial number-term that Enos planned to use.

Although the engraving of the Book of Jacob did not occur until after Sherem's challenge had been handled,[123] $Jacob_2$'s first referenced cardinal or N number-term "many hundred" (meaning 500) appears in a report of his ministry and a discussion of his purpose for engraving the plates. This report and discussion are placed in the *middle* of his book—well before the details of Sherem's challenge are presented.[124] When Sherem's attack is presented, $Jacob_2$'s other two N number-terms are included, with "some" centered between the two "many hundred" number-terms associated with $Jacob_2$'s ministry and its challenges.[125] By structuring his use of N number-terms in this manner, $Jacob_2$ was able to double his use of the "many hundred" number-term and the number 500 in the proposed Sets of his book. None of these structural and numerical choices appears to have been impromptu or erroneous.

At the end of his book and ministry, $Jacob_2$ apparently wanted to underscore the timing, nature, and seriousness of Sherem's challenge, and the miracle extended by God to his aged prophet and the Nephite people.[126] By creating the identical "many hundred" number-terms, $Jacob_2$ was able to identify an approximate number of years (rounded to the nearest 100) yet to occur in $Lehi_1$'s prophesied 600-year period and to give his Mercury-related Set-contexts a base of 1000 days. Indeed, the expressly general meaning of the determiner *some* in $Jacob_2$'s structural organization of time, the textual and symbolic centrality of "some" years in his presentation of the approaching 100-year anniversary of $Lehi_1$'s departure from Jerusalem, and $Jacob_2$'s doubled and bracketing references to "many hundred" years (around "some" years) all appear to have been designed to create, and emphasize the visibility of, the second and third proposed Sets and Set-sums in his book.

The Set-sum 1055 and its Mercury-related Set-context appear to be $Jacob_2$'s express and symbolic confirmation that $Nephi_1$'s Set-contexts implying 1.5, 14, 17.5, 22, and 23.5 sidereal periods of Mercury all were intentional references to that planetary period. Those Set-contexts were neither accidental nor merely ancillary to $Nephi_1$'s lunar symbolism. At the same time, $Jacob_2$'s clearly defined second Set occurs in a cultural context where Lehi calendar years appear to have been devotedly measured and definite numbers could have been used by $Jacob_2$ for his third Set. For example, $Jacob_2$ apparently could have stated something like "when 42 years had passed after I undertook the religious leadership of the Nephites", there were a full 502 years remaining "before [the Messiah's] coming". Nevertheless, $Jacob_2$ chose not to use number-terms

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[123] Jacob: introductory declaration.

[124] Jacob 4:1-7.

[125] Jacob 4:4; 7:1, 7.

[126] Jacob 7:6-23.

that specified such definite numbers. Instead, apparently based on diligent astronomical observation and record keeping, he created a Set and Set-sum representing 1055 days, which suggested a close accord with a known interval of 12 sidereal periods of Mercury. This Set-context may also imply that $Jacob_2$ learned geocentric astronomical observation and record keeping from, or perhaps developed these practices with, $Nephi_1$ and/or others living in or near the land of Nephi.

Two additional implications regarding the proposed astronomical records of $Jacob_2$ and the Nephite priesthood may be suggested. As Table 3.B indicates, every 13 tropical years, the length of 54 sidereal periods of Mercury could have been identified by using geocentric observation. Hence, every 26 tropical years, the length of 108 sidereal periods of Mercury could have been observed and calculated. Since 108 is evenly divisible by 12 (108/12 = 9), at least within the first 26 years of geocentric observation and record keeping at the city of Nephi, nine of the 1055-day intervals of 12 sidereal periods of Mercury could have been observed, calculated, and recorded. In other words, every 1055 days, 11 sidereal periods of Mercury each could have been computed as 88 days long and a 12th sidereal period could have been computed as 87 days long: (11x88) +87 = 1055. A second implication may be that by the time of $Jacob_2$'s transfer of the small plates to Enos, the Nephite priesthood had been organized and trained to observe, measure, and record $Lehi_1$'s 600-year prophecy within the context of 7-day weeks and 12-month lunar years, but the priesthood was engaged in their astronomy-related tasks on a day-by-day, night-by-night basis, and their observations were not limited to the phases of the moon.

3.6 The Book of Enos number-terms

Enos, Jarom, and Omni (three succeeding generations of $Jacob_2$'s descendants) each composed two temporal-expressions and placed the expressions in their separate books in the small plates of Nephi. The diction, language types, and positions of the two express number-terms composed by Enos occur in the following order:

1. "many", a referenced cardinal or N number-term that concludes $Jacob_2$'s (N) number-term letter-set; and
2. "an hundred and seventy and nine", a stated cardinal or L number-term that creates the (L) letter-set filled by the number-terms of $Jacob_2$'s later descendants.

The first temporal-expression recorded by $Jacob_2$'s son, Enos, is "many years passeth … before that he [the Messiah] shall manifest himself in the flesh".[127] The referenced cardinal or N number-term "many" seems indefinite, but its implied meaning appears to be chronologically precise. The textual sources referenced by this number-term include the narratives associated with $Jacob_2$'s three immediately preceding N number-terms,[128] which are all part of the same (N) letter-set. The associated narratives indicate that as the Nephites approached the occasion when 100 years had passed away following $Lehi_1$'s escape from Jerusalem, $Jacob_2$'s religious leadership and his Messianic teachings were challenged by Sherem. With the help of the Lord,

[127] Enos 1:8.

[128] Jacob 4:4; 7:1, 7.

$Jacob_2$ withstood the challenges,[129] but the conflict may have emphasized to $Jacob_2$ and his people that the time of his ministry was close to an end.

Enos, the son $Jacob_2$ apparently chose to be the next guardian of the small plates, seems to have been a youth at that time because he would safeguard the plates for approximately 80 years.[130] Enos seems to have been reluctant to accept the responsibilities offered by his aged father. Instead, Enos went hunting. However, his personal worthiness and capacity to carry out the offered calling seem to have burdened his mind. At some point during the hunting expedition, he spent most of a day and the following night pleading with the Lord.[131] God comforted Enos, but also commanded him to accept the responsibilities offered by his father. Enos accepted God's command, "go to it", and became $Jacob_2$'s successor guardian of the small plates.[132]

As part of his revelation from God, Enos remembered God stating that "many years passeth" before the Messiah's birth would occur. These "many years" could be interpreted as the same "many hundred years" (i.e., 500 years) referenced by two of $Jacob_2$'s temporal-expressions.[133] Indeed, as Table 2.A of this Division indicates, all three of these temporal-expressions may be described in terms of language types as RBGN expressions, the first three of four such expressions in the small plates of Nephi. The fourth is $Mormon_2$'s much later replication of the RBGN letter pattern, which he used to testify that the promise of the "many hundred years" remaining when $Jacob_2$ transferred the small plates to Enos had been fulfilled.

3.6.1 The 500-year or 502-year interval

The personalized or G time-terms in the three RBGN expressions in the books of Jacob and Enos all describe a future interval between the time of their associated narratives about $Jacob_2$ or Enos and the birth of the Messiah. For $Jacob_2$'s witness of Christ, the anticipated interval was "many hundred [5x100] years before his coming". In the challenge to $Jacob_2$, the prophecy denigrated by Sherem was about a "being" who was expected to come "many hundred [5x100] years hence". In the revelation to Enos, the same roughly 500 years seem to be projected to pass "before that he shall manifest himself in the flesh". Each of these future intervals in the Lehi era context was to be measured by the Nephites with the Lehi calendar. The three RBGN expressions associated with the transition in guardianship of the plates and the prophetic calling of Enos appear to assume that at least 500 Lehi calendar years remained to be observed and recorded. Apparently, the Nephites had maintained the Lehi calendar for nearly a century.

Perhaps, as suggested in Sections 3.5.6-3.5.8 above, at the time of the transition of guardianship from $Jacob_2$ to Enos, the Nephites had maintained the Lehi calendar through the end of its 97th year, but in the 98th year, 502 complete Lehi calendar years remained to be observed and recorded. The number-term of Enos does not include the cardinal number "hundred", but just the determiner "many" (as apparently used by God in his revelation to Enos). The specificity of 502 in quantifying "many" complete years likely would have been expected by

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[129] Jacob 7:6-23.

[130] Enos 1:25.

[131] Enos 1:1-4.

[132] Enos 1:5-8.

[133] Jacob 4:4; 7:7.

the Nephite people at that time. The following analysis of number-terms includes both 500 and 502 as alternatives for this number-term "many". Based on the mean length of a synodic month, 500 12-month lunar years or 6000 synodic months would be about 177183.54 days. This interval may represent a close accord with a period of 9-day cycles (9x19687 = 177183). An interval of 502 12-month lunar years is 6024 synodic months or about 177892.274 days. This interval suggests close accords with a period of 13-day cycles (13x13684 = 177892) and with a period of 6511 mean sidereal months (about 177891.328 days).

3.6.2 The 179-year interval

The second of the two temporal-expressions in the Book of Enos appears in the writer's concluding remarks near the end of his life. He notes that "an hundred and seventy and nine years had passed … from the time that our father Lehi left Jerusalem".[134] The time-term in this RBGL expression includes all the words of his father's long name or D time-term,[135] but Enos has personalized the era name by adding the words "our father". This personalized or G time-term is the 12th express time-term in the small plates of Nephi; so, the association with the number 12 may suggest a calendrical reason for the use of all the D time-term diction, i.e., another allusion to the Nephites' official, religious, 12-month lunar year. The related number-term chosen by Enos is a stated cardinal or L number-term, which creates the second letter-set of the concluding (NLN) number-term letter-group in these plates. Enos and each of his descendants who composed a temporal-expression filled this (L) letter-set with six of the same type of number-terms. The (NLN) letter-group eventually would be completed by $Mormon_2$'s (N) number-term letter-set hundreds of years after the descendants of Enos had ceased to write in the small plates of Nephi. Based on the mean length of a synodic month, the interval of 179 12-month lunar years is 2148 synodic months or about 63431.707 days. This interval suggests close commensurations with a period of 9-day cycles (9x7048 = 63432) and a period of 2331 mean draconic months (about 63431.685 days).

3.6.3 The Set with Set-contexts of 179 days

Set definition. The first proposed Set in the Book of Enos includes the single stated cardinal or L number-term. The referenced cardinal or N number-term "many" is distinguished by its language type and it is deemed to express no cardinal number name.

Set and Set-sum illustration. This Set and Set-sum may be depicted by the equation □ +179 = 179. The empty box represents the N number-term. The stated cardinal number-term provides a definite 179 to the equation.

Set-contexts. The Set-sum 179 implies a near accord with the length of 6.5 mean sidereal months (about 177.591 days). The Set-sum 179 also suggests a Set-context representing the largest number of days the Nephites may have observed and recorded in a period of six synodic months. Typically, a six-month semester would be measured with 177 or 178 days because the mean length of the interval is about 177.184 days. However, the Set-sum 179 seems to symbolize

[134] Enos 1:25.

[135] Jacob 1:1.

a remarkable six-month semester in which five of the six months were observed to be 30-day months.[136]

3.6.4 The Set with Set-contexts of 500 and 502 days

Set definition. The second proposed Set in the Book of Enos includes the single referenced cardinal or N number-term. The stated cardinal or L number-term is excluded because of its language type.

Set and Set-sum illustration. This Set may be represented by the equations 500+ □ = 500 and 502+ □ = 502. The empty box in each equation symbolizes the L number-term. The referenced cardinal number-term "many" may imply the number 500 (as an approximation like "many hundred" in the Book of Jacob) and the number 502 (as an exact number of complete years remaining in the interval prophesied by $Lehi_1$). Both proposed numbers fit with the associated narratives that end the Book of Jacob and begin the Book of Enos.

Set-contexts. The proposed Set-sum 500 suggests a single Set-context: a close accord with 25 20-day cycles (20x25 = 500). The alternative Set-sum 502 implies a close accord with the length of 17 mean synodic months (about 502.02 days) and a near accord with the length of 18.5 mean draconic months (about 503.426 days).

3.6.5 The Set with Set-contexts of 679 and 681 days

Set definition. The third proposed Set includes both the referenced cardinal or N number-term and the stated cardinal or L number-term.

Set and Set-sum illustration. This last proposed Set in the Book of Enos may be depicted by the equations 500+179 = 679 and 502+179 = 681. The referenced cardinal number-term again may imply the number 500 or the number 502.

Set-contexts. The Set-contexts suggested by the Set-sum 679 include close accords with the astronomical interval of 23 mean synodic months (about 679.204 days) and the calendrical equivalent of 97 7-day weeks (7x97 = 679). Additionally, the Set-sum 679 implies a near accord with the length of 25 mean draconic months (about 680.306 days). The Set-sum 681 suggests two Set-contexts: a near accord with the length of 23 mean synodic months and a close accord with the length of 25 mean draconic months.

3.6.6 Symbolism of the Enos number-terms

Nephite priest-astronomers apparently were dedicated to maintaining the proposed 7-day weeks, six-month lunar semesters, and 12-month lunar years of the Lehi era. Presumably, in carrying out their calendrical duties, they would have noted the unusual length of a 179-day six-month semester and would have been aware of the close accord of 97 7-day weeks and a 679-day measurement for most periods of 23 synodic months. To Enos, in particular, periods of 25 20-day cycles (20x25 = 500) and 17 mean synodic months (about 502.02 days) would have been reminders of the time and conditions surrounding his initial revelation from God and his taking responsibility for the small plates of Nephi. The close accords of 500, 502, and 179 days and

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[136] Parker, *The Calendars of Ancient Egypt*, 6.

years with periods measured by 7-day, 9-day, 13-day, or 20-day cycles also may suggest the priest-astronomers were involved in extensive astronomical observations, detailed record keeping, and painstaking projections. Indeed, they may have been concerned with attempting to create a retrospective understanding of the astronomical conditions at the time $Lehi_1$ left Jerusalem and the saga of their people began.

In addition, the symbolism of 502 days and 18.5 draconic months perhaps may be understood in connection with the beginning of an eclipse season (1.5 mean eclipse years are about 519.93 days). Similarly, the symbolism of 679 and 681 days, and 25 draconic months and 23 synodic months, may be understood in connection with the beginning of another eclipse season (2 mean eclipse years are about 693.24 days). A further implication may be that Enos maintained guardianship of the small plates until late in his long life, when known intervals of 23 synodic months and 25 draconic months could be symbolized by vital numbers related to his responsibility for the plates (500, 502, and 179). The most basic messages of such chronological accords seem to be that Nephite priest-astronomers were dedicated observers of the passage of time and, thus, their numerical record of Lehi calendar years passing could be trusted.

3.7 The Book of Jarom number-terms

The diction, language types, and positions of the two number-terms[137] recorded by Jarom, the son of Enos, occur in the following order:

1. "two hundred", a stated cardinal or L number-term that continues the (L) number-term letter-set begun by Enos; and
2. "two hundred and thirty and eight", another stated cardinal or L number-term for the (L) letter-set.

Unlike the RBGL expression that Enos used to begin his (L) letter-set, both temporal-expressions in the Book of Jarom are RBHL expressions (see Table 2.A of this Division). The time-term is omitted in each of Jarom's expressions. Nonetheless, the Lehi era context is implied by reference to the personalized long name diction of the time-term in his father's RBGL expression.

3.7.1 The 200-year interval

Like the number 500 referenced as the second and fourth cardinal numbers quantifying years in the Book of Jacob and like one of the alternative cardinal numbers (500) apparently quantifying years in the Book of Enos, the number-term "two hundred" stated by Jarom quantifies another period of hundreds of years that report the continued Nephite dedication to measuring and recording the passing of time with the Lehi calendar. Two hundred 12-month lunar years or 2400 mean synodic months would be about 70873.416 days. This interval presents close commensurations with the lengths of 2604.5 mean draconic months (about 70874.227 days) and 2594 mean sidereal months (about 70872.386 days). The implications of such close accords for mean lunar months may be depicted as follows.

Month type	Close accords	Implied mean	Modern mean	Difference
draconic	70874 or 70875 days	27.21232 days	27.21222 days	8.6 seconds

[137] Jarom 1:5, 13.

sidereal	70872 or 70873 days	27.32170 days	27.32166 days	3.5 seconds
synodic	70873 or 70874 days	29.53063 days	29.53059 days	3.5 seconds

From another perspective, 200 Lehi calendar years placed the moon in the same phase, at almost the same place in the stars, and at almost the same position vis-à-vis the opposite node as when $Lehi_1$ left Jerusalem. In addition, 7-day weeks and 9-day cycles reached a commensuration on the 70875th day (7x10125 = 9x7875 = 70875). These elapsed intervals may have suggested somewhat similar lunar events and day counts to be expected when 400 and then 600 Lehi calendar years had passed. No wonder Jarom recorded the passing of 200 Lehi calendar years. The observation, measurement, and recording of the first one-third of $Lehi_1$'s prophetic period had been accomplished and just two basically similar intervals remained to be observed, numbered, and recorded by the descendants of Jarom.

3.7.2 The 238-year interval

"[T]wo hundred and thirty and eight" of the proposed 12-month lunar years is the equivalent of 2856 synodic months or about 84339.365 days. The interval of 84339 days suggests a close accord with 9371 9-day cycles. The interval of 84340 days suggests a close accord with 4217 20-day cycles and a near accord with 3087 mean sidereal months (about 84341.964 days).

3.7.3 The Set with Set-contexts of 200 days

Set definition. The two RBHL temporal-expressions in the Book of Jarom have identical language compositions. The diction of their narrative-links ("had passed") and year-terms ("years") is identical, and their time-terms both are omitted. Hence, it might seem that Jarom intended just one Set and Set-sum for his book. Nonetheless, both of his chosen number-terms, when considered as numbers of days, present close accords somewhat similar to his father's number-terms and might suggest that he intended three Sets like his father. Thus, the first proposed Set consists of Jarom's first number-term, one that reminds the reader of his father's revelation and acceptance of responsibility for the small plates near the time when 100 Lehi calendar years had passed away. In other words, this Set appears to have been composed on the basis of the associated narratives involving both Enos and Jarom.

Set and Set-sum illustration. The proposed Set and Set-sum may be symbolized by the equation 200+ □ = 200. The empty box represents the years that had passed when Jarom transferred the plates to his son Omni. This empty box may suggest that the 200-year interval was recorded by Jarom long before his final temporal-expression was recorded.

Set-contexts. The Set-sum 200 suggests close accords with the lengths of ten 20-day cycles (20x10 = 200) and one-half of a mean synodic period of Jupiter (about 199.442 days).

3.7.4 The Set with Set-contexts of 238 days

Set definition. The second proposed Set in the Book of Jarom includes the last number-term recorded by Jarom, when he transferred the plates to his son Omni.

Set and Set-sum illustration. This proposed Set and Set-sum may be depicted with the equation □ +238 = 238. The empty box represents the time when 200 years had passed.

Set-contexts. The Set-sum 238 implies two Set-contexts. The first is a period of 34 7-day weeks (7x34 = 238), another statement of a most basic day cycle of the Nephite people. The

second Set-context, a near accord much like the near accord recorded by Enos (179), appears to symbolize a notable interval of synodic months. Eight synodic months usually would be measured with 236 or 237 days because the length of eight mean synodic months is about 236.245 days. However, for Jarom's reported interval, six of the eight months apparently had been observed as 30-day months and only two had been observed as 29-day months: (6x30) + (2x29) = 180+58 = 238.

3.7.5 The Set with a Set-context of 438 days

Set definition. The third Set proposed for the Book of Jarom consists of both stated cardinal or L number-terms.

Set and Set-sum illustration. The Set and Set-sum may be represented by the equation 200+238 = 438.

Set-context. The Set-sum 438 suggests two Set-contexts, the first of which is a close accord with the length of 16 mean sidereal months (about 437.147 days). The second Set-context appears to provide the third proposed Set-sum in the small plates that suggests a calendrical statement linking the 365-day calendar and the Venus synodic period through the use of the number 73. The related equations may be depicted as 365+73 = 6x73 = 438.

3.7.6 Symbolism of Jarom's number-terms

Jarom's number-terms extend the symbolism proposed for the writings of $Nephi_1$, $Jacob_2$, and Enos. Nephite priest-astronomers apparently were creating, or otherwise had access to, observational records related to the moon's cyclical phases and movements through the fixed stars. Constellations of fixed stars appear to have been known and charted. Nodes were understood and recorded. A further implication may be that Jarom, like his father Enos and grandfather $Jacob_2$, waited until late in life to transfer guardianship of the small plates to his son, at a time specifically chosen for its chronological symbolism. Jarom survived to record the passing of 238 years in the Lehi era context. Then, perhaps to provide a near or close accord with a sidereal month Set-context like $Nephi_1$, $Jacob_2$, and Enos had done before him,[138] Jarom may have delivered the plates "into the hands" of his son before the 239th Lehi calendar year had reached its end.[139]

3.8 The Book of Omni number-terms

"I Omni," wrote the son of Jarom, "would that ye should know that I fought much with the sword to preserve my people the Nephites from falling into the hands of their enemies the Lamanites. But behold, I of myself am a wicked man, and I have not kept the statutes and the commandments of the Lord as I ought to have done. And it came to pass that two hundred and seventy and six years had passed away; and we had many seasons of peace, and we had many seasons of serious war and bloodshed. Yea, and in fine, two hundred and eighty and two years

[138] See Sections 3.2.19, 3.3.14, 3.4.22, and 3.5.11 of this Part 3.

[139] Jarom 1:13-15.

had passed away; and I had kept these plates according to the commandments of my fathers, and I conferred them upon my son Amaron. And I make an end."[140]

Omni's second temporal-expression almost immediately follows his first. One need not speculate why. He stated clearly that he "had kept these plates according to the commandments of [his] fathers". His temporal-expressions are both RBHL expressions like his father's expressions (see Table 2.A of this Division). The time-terms are omitted from both of Omni's temporal-expressions and, as with his father's temporal-expressions, the Lehi era context may be implied by reference to the time-term in the second temporal-expression of Enos, the temporal-expression that created this last (L) letter-set in the small plates of Nephi. The only differences between Omni's temporal-expressions and those of his father are the values of their number-terms. Omni's number-terms—indeed the number-terms of all five RBHL temporal-expressions—deserve a carefully coordinated analysis. As will be proposed in Section 3.12 below, Enos seems to have commanded them all to be recorded by the then-current guardian of the plates when the specified number of years had expired.

The diction, language types, and positions in the text of the number-terms recorded by Omni occur in the following order:

1. "two hundred and seventy and six", a stated cardinal or L number-term that continues the (L) letter-set begun by Enos; and
2. "two hundred and eighty and two", another stated cardinal or L number-term for the (L) letter-set of Enos.

3.8.1 The 276-year interval

An interval of 276 12-month lunar years may be equivalent to 3312 mean synodic months (about 97805.314 days). This interval is about five days longer than the lengths of 4890 20-day cycles or 3260 30-day cycles (20x4890 = 30x3260 = 97800), 844 mean synodic periods of Mercury (about 97800.644 days), and 3594 mean draconic months (about 97800.719 days). However, the text does not suggest that $Lehi_1$ and his descendants understood, measured, and recorded 20-day cycles, 30-day cycles, draconic months, and synodic periods of Mercury from the day they left Jerusalem. The text does state that Omni "had kept these plates according to the commandments of [his] fathers". That may suggest that he was commanded to record the passing of 276 years.

3.8.2 The 282-year interval

An interval of 282 12-month lunar years implies a near accord between 3384 mean synodic months (about 99931.517 days) and 1136 mean sidereal periods of Mercury (about 99933.227 days). The difference is about 1.71 days. The understanding of this near commensuration of a Mercury period and synodic month interval was impossible to have been based on observations of Mercury and record keeping by $Lehi_1$ and his descendants from the time they left Jerusalem. Determining the sidereal period of Mercury based on geocentric observation requires the observers to use an unchanging position on earth and a sighting line keyed to a solstice or

[140] Omni 1:1-3.

equinox position of the sun. Lehi$_1$ and his descendants were refugees for perhaps two decades or more. Again, it seems that Omni may have been commanded to record the passing of 282 years.

3.8.3 The 184- and 188-year intervals based on 18-month years

The intervals of 276 and 282 Lehi calendar years both may be reconfigured as intervals of 18-month lunar years. Unlike the 500-year or 502-year and 179-year periods of Enos and the 200-year and 238-year periods of Jarom, Omni's two intervals of years both include an even number of 18-month lunar years: 18x184 = 12x276 = 3312 and 18x188 = 12x282 = 3384. As mentioned in Part 2 of this Division,[141] from a chronological standpoint, the close accord of 18 synodic months (531.551 days) and 39 half-draconic months (530.638 days) and the even closer correlation of two 260-day cycles (520 days) and three eclipse half-years (519.93 days) within the temporal context of each 18-month year appear to have been intervals followed in ancient Mesoamerica because they may have been used to record and predict lunar and solar eclipses within human and agricultural fertility contexts.[142] Did Omni's recorded periods of 276 and 282 years relate to his concerns about defending the Nephite people and their stores of food and seeds in connection with eclipse seasons? The connection, if there is one at all, seems unusual, indistinct, and distant.

3.8.4 The 38-year intervals

Omni's recorded periods also occur in a chronological context related in some manner to 38-year intervals. The first interval of 38 Lehi calendar years is suggested by Jarom's two temporal-expressions (200+38 = 238) and a second 38-year interval is implied by Jarom's last temporal-expression and Omni's first temporal-expression (238+38 = 276). Omni's son Amaron implies a third 38-year interval between Omni's last temporal-expression and Amaron's only temporal-expression (282+38 = 320). Thus, the potential meanings of 38-year intervals appear to require examination even though the number name "thirty and eight" is not expressly mentioned in the books of Jarom and Omni.

Thirty-eight 12-month lunar years or 456 synodic months average about 13465.948 days. This interval is about four days shorter than a close accord of the lengths of 493 mean sidereal months (about 13469.578 days) and 495 mean draconic months (about 13470.049 days). From an observational point of view, the moon may seem to return to the orbital track of the sun and the same place in the stars a few days after the end of 38 12-month lunar years. Nonetheless, the nearest eclipse season does not occur until about one to two months later. Thirty-nine mean eclipse years average about 13518.18 days). An eclipse season of 34.5 days would begin at about 13500.93 days and last until about 13535.43 days. Hence, a 38-year lunar interval may have been standardized to provide a long-term warning of an eclipse season within the two synodic months that begin the next Lehi calendar year. Also, 38 12-month years is the equivalent of 76 six-month semesters and three intervals of 76 six-month semesters is the equivalent of 76 18-month lunar years. Is this chronological connection between three intervals of 76 six-month semesters and 76 18-month years another of the reasons that three 38-year intervals were eventually recorded by

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[141] See Division 2, Part 2, Sections 2.5.8 and 2.5.9.

[142] Grofe, "Glyphs G and F: the cycle of nine, the lunar nodes, and the draconic month", 143.

Jarom, Omni, and Amaron? Did Enos or Jarom design the 38-year repetitions and require his descendants to compose two more 38-year periods? If 38-year periods were important, what was the purpose of the six-year interval inserted by Omni between 276 and 282 Lehi calendar years? The Book of Omni appears to be silent on such issues, other than its statement that Omni "kept these plates according to the commandments of [his] fathers".[143]

3.8.5 The Set with a Set-context of 276 days

Set definition. The first proposed Set in Omni's writings is his initial stated cardinal or L number-term (276).

Set and Set-sum illustration. The Set and Set-sum may be represented by the equation 276 + □ = 276. The empty box represents the fourth of the five RBHL temporal-expressions that follow the RBGL temporal-expression of Enos, in which the Lehi era context was specified by Enos's personalized or G time-term.

Set-context. The Set-sum 276 implies an interval of 276 days, but that interval does not suggest a near or close accord with the length of any interval listed in Table 3.A. A seasonal interval may be suggested as a Set-context. The immediately following text mentions "many seasons of peace, and … many seasons of serious war and bloodshed". Perhaps seasons of the tropical year were identified with peace and agricultural activity, but also war in a dry season.

In the seventh, sixth, and fifth centuries BCE, the summer semester of the tropical year was "always 186 days, whereas that from fall to spring [was] either 179 or 180". The approximate intervals were: winter to spring (90-92 days); spring to summer (94 days); summer to fall (92 days); and fall to winter (88-89 days).[144] A winter solstice to fall equinox interval may have been measured as 276, 277, or 278 days. Hence, the Set-sum 276 may suggest a Set-context of the shortest winter solstice to fall equinox season. Again, however, the potential symbolism seems unusual, indistinct, and distant.

3.8.6 The Set with a Set-context of 282 days

Set definition. The second proposed Set in the Book of Omni is composed of the other stated cardinal or L number-term (282) engraved by Omni.

Set and Set-sum illustration. The Set and Set-sum may be depicted by the equation □ +282 = 282. The empty box represents the third of the five RBHL temporal-expressions that follow the RBGL temporal-expression of Enos.

Set-context. The Set-sum 282 suggests a single Set-context: a near accord with the length of 9.5 mean synodic months (about 280.541 days).

3.8.7 The Set with Set-contexts of 558 days

Set definition. The third proposed Set for Omni's writings consists of both of his stated cardinal or L number-terms.

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[143] Omni 1:3.

[144] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 99, 113.

Set and Set-sum illustration. The proposed Set and Set-sum may be symbolized by the equation 276+282 = 558.

Set contexts. The Set-sum 558 suggests two Set-contexts: close accords with the lengths of 62 9-day cycles (9x62 = 558) and 20.5 mean draconic months or 41 mean half-draconic months (about 557.851 days).

3.8.8 Amaron's 320-year interval

The Book of Omni does not end with Omni's death. Four of his descendants (his sons Amaron and Chemish, and Chemish's son and grandson, respectively Abinadom and Amaleki) all added their reports to Omni's book.[145] However, of these four writers, only Amaron recorded a temporal-expression in the Book of Omni.[146] Amaron's temporal-expression is the fifth of the five RBHL expressions that follow and rely on Enos's RBGL temporal-expression for their identification of the Lehi era context. It is also the 11th number-term added to the small plates by $Jacob_2$ and his descendants. The diction of Amaron's single number-term, its language type, and its position in the text are as follows:

1. "three hundred and twenty", the sixth and final stated cardinal or L number-term in the (L) letter-set begun by Enos some 141 Lehi calendar years earlier.

When this number-term was recorded, six major divisions already had been formed in the small plates of Nephi. Amaron recorded no concern that a seventh book was not named for him. He simply noted that his writings were "in the book of [his] father".[147] Later, his brother Chemish noted that he was writing "in the same book with my brother".[148] The critical issue for these writers seems to have been a genealogical one, rather than a structural one involving the formation of a seventh major division. They seem to have understood that forming a seventh book was not part of their duties as guardians of the plates. Similarly, after Amaron's temporal-expression was recorded, neither Chemish nor his descendants added any more temporal-expressions to the Book of Omni. The 11th expression recorded by their ancestor $Jacob_2$ and other relatives apparently completed all the temporal-expressions to be included within the four major divisions that followed $Nephi_1$'s writings. In other words, Chemish and his descendants seem to have understood that they were to carefully record their family connections within the Book of Omni, while reserving the seventh major division and 12th temporal-expression to be composed by one of their descendants for the time when the end of $Lehi_1$'s 600-year period and the birth of the Messiah could be recorded.

An interval of 320 12-month lunar years or 3840 synodic months averages about 113397.466 days. This interval cannot be reconfigured as an even number of 18-month lunar years. However, it does suggest a near accord with the length of 4151.5 mean sidereal months (about 113398.55 days). These synodic and sidereal month intervals suggest overlapping close accords measured with 113397-113398 days and 113398-113399 days, respectively. Moreover, a day or two longer and the intervals of five of the potential day cycles reach notable completions: 13x8723 = 113399; and 7x16200 = 9x12600 = 20x5670 = 30x3780 = 113400.

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[145] Omni 1:4, 8-10, 12.

[146] Omni 1:5.

[147] Omni 1:4.

[148] Omni 1:9.

Several issues are raised by Amaron's number-term 320. Was the end of 320 Lehi calendar years chosen solely to emphasize the calendrical and astronomical commensurations noted above? Probably not, but further analysis is required to answer that question definitively. Since Amaron wrote in the book of his father, does his number-term relate calendrically or astronomically to the earlier number-terms in the book? The answer to this question appears to be yes. As noted above, Amaron's number 320 is exactly 38 from Omni's second number 282 and Omni's first number 276 is exactly 38 from Jarom's second number 238, which is exactly 38 from Jarom's first number 200. It seems unlikely that these three 38-year calendrical periods were reported by accident. Like the 38-year lunar periods suggested above for Jarom and Omni, Amaron's 38-year period, ending when 320 Lehi calendar years had passed, also may have been partially chosen because of its association with eclipse recording and prediction. An interval of 4167 mean draconic months (about 113393.321 days) measures just a few days less than 320 Lehi calendar years.

Another issue is the meaning of Omni's six-year interval (276 to 282) that seems to have postponed the repetition of the third 38-year period. That issue cannot begin to be addressed without taking a different view of the intervals between the number-terms. From Jarom's last number 238 to Omni's last number 282, the interval is 44 and from Omni's first number 276 to Amaron's only number 320, the interval also is 44. Forty-four 12-month lunar years or 528 synodic months average about 15592.152 days, an interval that suggests a close accord with the length of 573 mean draconic months (about 15592.602 days), which is almost as long as 45 mean eclipse years (about 15597.903 days). In other words, an interval of 44 12-month years may have been seen as extending from one eclipse season through 45 eclipse years and ending with a 46th eclipse season nearly 15600 days later.

What, if anything, does a 38-year or a 44-year period and/or an eclipse season have to do with Omni's "seasons of peace" and of "serious war and bloodshed"? At this point in the analysis, it is not possible to suggest complete answers to these questions because the answers appear to involve many temporal-expressions in the plates of Mormon and the plates of Moroni. Questions related to 38-year and 44-year intervals, eclipse seasons, and "seasons of peace" and of "serious war and bloodshed" will be addressed again in Divisions 3 and 4 of this source book.

The 44-year intervals suggested by the number-terms of Jarom, Omni, and Amaron overlap for six years. Why do they overlap? The six-year interval and the related symbolic intent of the number-terms recorded by Jarom, Omni, and Amaron in the (L) letter-set begun by Enos can be examined in this Part. Before doing so, however, the four proposed Sets associated with Amaron's number-term should be presented, so that this additional information may be used.

3.8.9 The Set with a Set-context of 320 days

Set definition. The first proposed Set that uses Amaron's stated cardinal or L number-term includes the only number-term recorded by him.

Set and Set-sum illustration. The Set and Set-sum may be depicted by the equation □ + □ +320 = 320. The empty boxes represent the other two L number-terms in the Book of Omni. Presumably, Amaron's number-term was intended to be understood in a context with the other number-terms of this major division.

Set-context. The Set-sum 320 implies a single Set-context: a close accord with the length of 16 20-day cycles (20x16 = 320).

3.8.10 The Set with Set-contexts of 602 days

Set definition. The second proposed Set that includes Amaron's number-term also includes Omni's last number-term 282. This combination of two consecutive number-terms is similar to the combinations proposed earlier in the separate writings of Enos (502+179 = 681), Jarom (200+238 = 438), and Omni (276+282 = 558), except that Amaron's apparently planned Set is based on the consecutive number-terms of two writers in the same major division, rather than just a single writer.

Set and Set-sum illustration. The proposed Set may be represented by the equation □ +282+320 = 602. The empty box represents Omni's first number-term.

Set-contexts. The Set-sum 602 suggests two Set-contexts: close accords with the lengths of 86 7-day weeks (7x86 = 602) and 22 mean sidereal months (about 601.077 days). One may note that this Set-sum was analyzed in Section 3.2.11 above with regard to the Sets in First Nephi.

3.8.11 The Set without a typical Set-context

Set definition. The third proposed Set with Amaron's number-term includes Omni's first number-term 276. This combination possibly should be considered ancillary to the proposed Sets for this major division because the number-terms are neither consecutive nor are they recorded by the same writer. Moreover, there seems to be no typical Set-context. This Set is listed here because it draws attention to the unusual composition and results of this combination.

Set and Set-sum illustration. The proposed Set may be depicted by the equation 276+ □ +320 = 596. The empty box represents Omni's second number-term.

Set-contexts. The Set-sum 596 does not appear to imply a near or close accord with any interval listed in Table 3.A or any other chronological statement. An interval of 596 days is five days less than 22 mean sidereal months (about 601.077 days) and five days more than 20 mean synodic months (about 590.612 days). It is one day less than near accords with the lengths of 22 mean draconic months (about 598.669 days) and 1.5 mean synodic periods of Jupiter (about 598.326 days). None of these potential symbolic intervals is a conventional Set-context.

To be sure, six other proposed Set-sums sorted by major division do not appear to be related to temporal intervals listed in Table 3.A or to other chronological statements. However, all six are based on Sets that included alternative numbers implied by the two referenced ordinal or M number-terms in $Nephi_1$'s quotations from the Book of Isaiah. That is, they were alternative Set-sums implied by prescribed sources in the brass plates. This unique Set and Set-sum again seem to draw attention to the number-term 276.

3.8.12 The Set with a Set-context of 878 days

Set definition. The fourth proposed Set that uses Amaron's number-term includes both of Omni's number-terms. This combination of number-terms is similar to the combinations proposed earlier in the separate writings of Enos (502+179 = 681) and Jarom (200+238 = 438), where their combinations also represented the number-terms of entire books. This is the Set for the entire Book of Omni.

Set and Set-sum illustration. The proposed Set and Set-sum may be symbolized by the equation 276+282+320 = 878.

Set-context. The Set-sum 878 implies a single Set-context: a near accord with the length of 10 mean sidereal periods of Mercury (about 879.694 days).

3.8.13 Number-term symbolism recorded by the descendants of Enos

Amaron's seeming attention to the 7-day week of the Lehi era, the 20-day cycle, and the movements of the moon and Mercury through the fixed stars may be indicated by the foregoing Set-contexts. His use of a standard RBHL temporal-expression also suggests that when more than half of $Lehi_1$'s 600-year period had passed, his Nephite descendants were still maintaining the Lehi calendar for their religious purposes.

The addition of two generations' number-terms in the Book of Omni clearly raises the question of additional multi-generational or combined writers' Sets. Nonetheless, except for the multi-generational Sets that appear to have been intended in the Book of Omni, any such proposed Set in the small plates would need to extend from one major division to another. The issues associated with such combined writers' Sets will be examined after the number-term composed by $Mormon_2$ for his major division has been analyzed.

Before proceeding with the examination of $Mormon_2$'s number-term, however, this study must examine the possibility that the RBHL temporal-expressions in the books of Jarom and Omni were planned together and this study will suggest the apparent symbolism of the five L number-terms when considered as an intentional group. To be clear, the following discussions in Sections 3.9 through 3.12 of this Part are not concerned with combined writers' Sets that may be implied by the five number-terms in the books of Jarom and Omni. Instead, the examination addresses the apparent meanings of such number-terms when they are considered to represent numbers of calendrical days. The discussion will suggest the calendrical symbolism of such meanings within a Mesoamerican context.

To prepare the calendrical groundwork for this examination, a much more detailed introduction to the proposed Mesoamerican "calendrical genealogy"[149] must be undertaken. Three specific issues require elaboration. The first is the systematic makeup of the 260-day calendar, by which the various 365-day calendars were named. The 260-day calendar was ancient when $Lehi_1$ and his followers arrived in their "land of promise"[150] and this calendar has been consistently measured into modern times in some parts of Mesoamerica.[151] The second issue is the systematic makeup of the 365-day calendar, which helped to define and measure the 52-year Calendar Round (52x365 = 73x260 = 18980) and the much lengthier Mesoamerican solar era (29x18980 = 550420). The use of the Mesoamerican form of the 365-day calendar seems to have begun at least several hundred years before the people of Nephi settled among their neighbors in the New World. Nonetheless, during the time reported by the temporal-expressions of $Nephi_1$, $Jacob_2$, and $Jacob_2$'s descendants (approximately 597 to 276 BCE), the understanding of the solar era in Mesoamerica and the calendars that the priest-astronomers used to measure that era appear to have continued to develop in a unique and orderly way. Thus, the third issue is the distinctive nature of those recorded developments, the calendrical genealogy of

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[149] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 99

[150] 1 Nephi 2:20; 5:5.

[151] Aveni, *Empires of Time*, 197.

"the land between the seas" or "Anahuac",[152] which since 1943 also has been referred to as "Mesoamerica".[153] "The central importance of the calendar to the religions of Anahuac and the central importance of religion to everything else conspire to make the history of the calendar something of a key to the general cultural history of the region."[154] Each of these three calendrical issues appears to be crucial to an understanding of the number-terms recorded by Jarom, Omni, and Amaron, and to a comprehension of their origin, which this study will suggest in Section 3.12 seems likely to have occurred during the period when Enos was guardian of the small plates of Nephi (approximately 495 to 413 BCE).

3.9 The sacred calendar of Mesoamerica

Geographically defined, Mesoamerica includes "most of central, southern, and southeastern Mexico (and encompasses the Yucatán Peninsula), Guatemala, Belize, and the westernmost portions of Honduras and El Salvador."[155] The diverse peoples of Mesoamerica came from many locales and eventually spoke more than 50 languages,[156] but they were mostly farmers of peppers, squash, beans, and maize. They "lived in villages, towns, and cities, and [they] traded" in organized markets. Although their culture was not identical everywhere, they had screen-fold bark paper books and they held many common religious beliefs, such as the certainty that one's own blood or the blood of a captive must be spilled to honor one's ancestors and the gods, and that an ancient 260-day calendar was to be used for timing ceremonies, naming children, and providing personal divination throughout life.[157] This 260-day calendar appears to have been the most permanent of the Mesoamerican calendars. Its earliest surviving use may be evidenced by "the earliest recognizable calendrical glyphs", which appear to be Olmec, "possibly those carved in stone at Chalcatzingo, perhaps as early as 1150-900 B.C." However, these glyphs "are not accompanied by numeral coefficients and so do not directly attest to the presence" of the 260-day calendar.[158] Whenever the sacred calendar may have been devised, it was composed of two interwoven day counts: a period of 20 named days and a period of 13 numbered days. Their combination at some point in the distant past created a unique calendar having a total length of 260 days.

3.9.1 The 20 day names

Twenty sequential days were given names and then the subsequent days were given the listed names, repeated over and over in the same order. The various Mesoamerican words for the 20 days of the calendar appear to have varied somewhat from people to people. Edmonson provisionally identified the English meanings of the 20 earliest known day names (which he referred to as "Olmec") and their later modifications by other Mesoamericans, as shown in Table

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[152] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 1.

[153] "The term … was invented by Paul Kirchhoff ["Mesoamerica," *Acta Americana* 1 (1943): 92-107]". Schele and Freidel, *A Forest of Kings*, 420 n.2.

[154] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 4.

[155] Coe, *Breaking the Maya Code*, 58.

[156] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 1-4.

[157] Coe, *Breaking the Maya Code*, 59; Schele and Freidel, *A Forest of Kings*, 37-38.

[158] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 98.

3.F. He noted that the Olmec day Sun "was everywhere the first day" of the 260-day calendar, even though its meaning was changed over the years.[159] Days in Mesoamerica were considered to be gods manifesting themselves; so, their names were thought to be sacred and were written with a variety of glyphs representing the gods.[160] Hence, the 260-day calendar also is referred to as the sacred calendar of Mesoamerica.

This use of 20 names was consistent with the base-20 system of numeration used most often in Mesoamerica. Unlike the principal form of modern numeration, which uses a base-10 or *decimal* system, numeration in ancient Mesoamerica primarily used a base-20 or *vigesimal* system. Dr. Ernst Förstemann, Royal Librarian of the Electorate of Saxony, discovered this fact during his study of the Dresden Codex, one of the few surviving Maya screen-fold books. He had arranged for the 1880 publication of "an incredibly accurate facsimile" of this codex while serving at the Dresden Library.[161] Förstemann "first discovered and worked out the ingenious vigesimal system of numeration used by the Maya, and … first pointed out how this system was utilized to record astronomical and chronological facts".[162]

The number 20 constituted "one full count" for the Aztecs, meaning the 20 fingers and toes of a human being.[163] For the Maya who flourished hundreds of years earlier, the number 20 was known by words such as *kal*, *may*, and *uinic*. "The last is the term for 'man' or 'human being' and in this context refers to the totality of his digits. The other terms are apparently related to words for tying and bundling and may reflect practices of counting and packaging in ancient commerce and rendering of tribute."[164] This base-20 numbering system included both numerical place values and (at least for the Maya) a written zero.[165] The vigesimal system was not unique; base-20 numeration systems apparently have been found among peoples in all the continents and in Oceania.[166] The time when the base-20 system came to be used in Mesoamerica is unknown but the system eventually was part of the Olmec culture.[167]

3.9.2 The 13 day numbers

Besides the 20 sequential day names, each day in the sacred calendar was assigned one of 13 numbers, usually ranging from 1 through 13; however, in a couple of variant calendars the range was 2 through 14. This "number system was generally decimal, though there are indications in a number of the languages of other numerical bases…. In at least two cases, the 13-day count used a special tridecimal number system sacred to this purpose".[168] Like the 20 names, the 13 sacred numbers were repeated over and over in the same order, so that the two methods for identifying

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[159] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 4-5, 124-25, 169-77.

[160] Aveni, *Empires of Time*, 195-97; see also Thompson, *Maya Hieroglyphic Writing: Introduction*, 69-93.

[161] Coe, *Breaking the Maya Code*, 107-108.

[162] Sylvanus Griswold Morley, *An Introduction to the Study of the Maya Hieroglyphs* (Washington, DC: Bureau of American Ethnology, Smithsonian Institution, Bulletin 57, 1915), iii.

[163] Brian M. Fagan, *The Aztecs* (New York: W. H. Freeman and Co., 1984), 214.

[164] Michael P. Closs, "The Mathematical Notation of the Ancient Maya," in Michael P. Closs, ed., *Native American Mathematics* (Austin: University of Texas Press, 1986), 293.

[165] Closs, "Mathematical Notation," 291-292.

[166] A. Seidenberg, "The Zero in the Maya Numerical Notation," in Closs, *Native American Mathematics*, 382-383.

[167] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 98, 111-17.

[168] Ibid., 4-5, 241-43, 251.

individual days became interwoven. Numbers often were written with combinations of a round dot (representing one) and a bar (representing five),[169] but numbers also were considered to be gods. Thus, they could be represented by glyphs depicting the heads of the gods. Perhaps as part of this deification, the numbers also took on religious and divinatory meanings in addition to their numerical values.[170] Table 3.G depicts illustrative Maya glyphs and bar and dot characters representing the 13 sacred day numbers.

3.9.3 Interwoven sacred days

An example of a 260-day calendar in which the names and numbers for the days are interwoven appears in Figure 3.1. The meanings of the day names in this Figure are the same as the earliest ones listed in Table 3.F. The first day of this proposed Olmec 260-day calendar is "1 Sun", the second day is "2 Wind", the third is "3 Night?", the 13th day is "13 Cane", the 14th is "1 Jaguar", the 26th day is "13 Death", the 27th day is "1 Deer", and so forth. This process of numbering and naming days is similar to the way the day numbers of Gregorian calendar months may be set beside the English names of weekdays.[171] For example, the initial day of the month of January may be designated by the numeral 1 and sometimes fall on a Monday. Thereafter, the day numbers and weekday names would be 2 Tuesday, 3 Wednesday, 4 Thursday, 5 Friday, 6 Saturday, 7 Sunday, 8 Monday, 9 Tuesday, and so forth. The days 2 Tuesday and 9 Tuesday are understood to be seven days apart. In the more complex 260-day calendar, the days 2 Eagle and 9 Eagle may be understood to be 20 days apart and the days 3 Night? and 3 Owl? may be understood to be 13 days apart. The day 1 Sun has been chosen as the initial day for Figure 3.1 for two reasons: first, because the Olmec day Sun "was everywhere the first day" of the 260-day calendar;[172] and second, because the following day 40 or 1 Lord, at the other end of the first column, was the "name day" (and last day) of an immensely important Mesoamerican 365-day, terminally named, calendar in which the summer solstice fell on day 6 Sun in 739 BCE. (More about the relationship of the two sacred names Sun and Lord in this crucial year is discussed in Sections 3.10.1-3.10.3 below.)

The 260-day calendar has been called "*the* centerpiece of the Maya calendar system".[173] The days of this calendar were "[e]verywhere sacred", in addition to being "preserved in oral and written form with remarkable tenacity and conservatism".[174] The calendar also may be described as being strictly mathematical; that is, a set number of days were repeated without the insertion of any intercalary day or any other break in the constant count of 260 days each year. Thus, an essential part of the priest-astronomers' culture (particularly as to astronomical and calendrical

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[169] In the "Autumn of 1832" edition of his self-published journal, Dr. Constantine Samuel Rafinesque, appears to have been the first Euro-American to publish (together with a great deal of interpretative speculation) an accurate understanding of the Mesoamerican bar and dot system of numerical figures. C.S. Rafinesque, ed., "Second Letter to Mr. Champollion on the Graphic System of America, and the Glyphs of Otolum or Palenque, in Central America—Elements of the Glyphs", in *Atlantic Journal and Friend of Knowledge* (Philadelphia: William Sharpless, 1832), vol. 1, no.3, 40-44, accessed at biodiversitylibrary.org/item/234877#page/50/mode/1up. See also Aveni, *Empires of Time*, 190-93; Coe, *Breaking the Maya Code*, 89-91.

[170] Aveni, *Empires of Time*, 199-200; see also Thompson, *Maya Hieroglyphic Writing: Introduction*, 93-94.

[171] Aveni, *Empires of Time*, 197.

[172] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 4-5.

[173] Aveni, *Empires of Time*, 197, italics in the original. See also Schele and Freidel, *A Forest of Kings*, 79-81; Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 1-4.

[174] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 169.

observation and record keeping) surely was the sacred calendar, "the single most important block of time"[175] measured by the peoples of Mesoamerica.

3.10 The 365-day calendar of Mesoamerica

In addition to the sacred calendar, Mesoamericans appear to have begun approximating the solar year with a 365-day calendar before the seventh century BCE. "The earliest indisputable evidence of an Olmec day count [260-day calendar] occurs as part of an already fully developed [C]alendar [R]ound—the earliest known…. It is almost certainly earlier than 600 B.C. and may be as much as 200 or 300 years earlier."[176] Unlike the sacred calendar, 365-day calendars were not exclusive to this part of the ancient world.[177] However, the composition of the Mesoamerican version seems to have been unique and similar to the 260-day calendar in that 18 of its months were composed of 20 days each.[178] The 360-day period was followed or proceeded by a 19th month of just five days, a period known as the "resting or sleep" of the year.[179] Edmonson noted that the calendar he called the "Tikal calendar" and "virtually all the Mayan calendars" were named for their first days". Many other Mesoamerican calendars "named the years for what were considered to be their last day: the final day of the eighteenth [20-day] month".[180] Typically, the months were identified by names, but they also could be identified by secular cardinal or ordinal numbers. Modern writers usually depict the day numbers of the months with figures ranging from 0 through 19 (and 0 through 4 for the resting month). However, the ancients seem to have identified the first day of each month in this 365-day calendar as the day when the month was "seated". They did not identify the first day of this calendar with a zero. The day when the month was "seated" was followed by days numbered 1 through 19 (and 1 through 4 for the resting month). This study follows the modern convention of using the figure 0 rather than the word *seating*. The system of numbering days of a month also has its exceptions. In some of the later calendars, a "single glyph for 'seating' (0) … became 'ending' (20)", so that the days of a typical month in those calendars were numbered 1 through 20 ("ending").[181]

3.10.1 The 365-day "Pre-Cuicuilco" calendar

Figure 3.2 depicts an example of an early Mesoamerican 365-day calendar year that appears to have existed during the eighth century BCE. This example is inferred from the detailed calendrical genealogy proposed by Edmonson for the eighth through the fourth centuries BCE.[182] These centuries included the times of $Lehi_1$, $Nephi_1$, $Jacob_2$, and $Jacob_2$'s descendants who recorded temporal-expressions in the small plates of Nephi. The proposed calendrical genealogy is depicted in Figure 3.3. The provisional calendar names in Figure 3.3 are those suggested by

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[175] Aveni, *Empires of Time*, 197.

[176] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 98, 100.

[177] Parker places the institution of the Egyptian 365-day calendar around 2500 BCE. Parker, *The Calendars of Ancient Egypt*, 51-56.

[178] See Division 2, Part 2, Section 2.5.9.

[179] Schele and Freidel, *A Forest of Kings*, 429 n.33.

[180] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 9-10. See also Michael P. Closs, "The Mathematical Notation of the Ancient Maya," in Michael P. Closs, ed., *Native American Mathematics* (Austin: University of Texas Press, 1986), 295.

[181] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 5-8, 233. See Schele and Freidel, *A Forest of Kings*, 81, for the apparent proposition that the "seating" day among the Maya always was the last day of each calendar month.

[182] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 97-101, 111-21.

Edmonson. However, he did not propose a name for the 365-day calendar that seems to have preceded his "Calendar A" or "Cuicuilco" calendar. In this study, the early calendar depicted in Figure 3.2 is designated the "Pre-Cuicuilco" calendar because of the Cuicuilco calendar reform that appears to have occurred during one of its 365-day years.[183]

Proleptic calendar dates. The Gregorian proleptic calendar date (22 June 739 BCE), which appears in Figures 3.2 and 3.3, seems normal for a summer solstice because it is based on the Gregorian calendar being projected into the distant past. When a Julian calendar is similarly projected into the distant past, its dates usually differ from those of a Gregorian proleptic calendar. For example, in 739 BCE, the Gregorian proleptic calendar date called 22 June is the same day as the Julian proleptic calendar date called 30 June. To avoid confusion, one must be clear which proleptic calendar is being used. In Edmonson's discussions of his proposed calendrical genealogy, he used both Julian proleptic calendar dates (usually labeled "Julian" or "J") and Gregorian proleptic calendar dates (usually labeled "Gregorian" or "G"). In this study, proleptic calendar dates are uniformly based on the Gregorian proleptic calendar.

260-day calendar dates. The 260-day calendar date (6 Sun), which appears in Figures 3.2 and 3.3, is unfamiliar to most people, but it likely was already ancient in 739 BCE (see Tables 3.F-3.H). In the cells of Figure 3.2, the proposed Olmec 20 day names are identified by the 20 lower case letters assigned to each day of the year (see Table 3.F). The 13 sacred day numbers cycle daily throughout the year in the manner depicted in Figure 3.1 for the 260-day calendar. After the end of the first 13 20-day months, the 260-day calendar begins to repeat itself and continues to do so for another 105 days, to the conclusion of the 365-day calendar year. The following Pre-Cuicuilco calendar year commenced on the next day of the 260-day calendar. Thus, over four consecutive 365-day Pre-Cuicuilco calendar years, the sacred day name of the first day and the 261st day shifts along the list of sacred day names in a clear pattern and then repeats in a four-year pattern. These repeating name days, at least for the series of 365-day years that preceded the year depicted in Figure 3.2, were Serpent (letter e), Foot (letter j), Eagle (letter o), and Lord (letter t). The first and 261st "name days" of the Pre-Cuicuilco calendar also were designated the New Year and little New Year, respectively. These two name days in Figure 3.2 are marked with thick line boxes and the sacred day designation 1.t (meaning "1 Lord"). In addition, the division of the year into a 260-day portion and a 105-day portion is indicated with a thick line between the 13th and 14th calendar months. This pattern of arranging the months and using initial naming to identify and name days of the years, and their New Year and little New Year days, appears to have changed during the Pre-Cuicuilco calendar year depicted in Figure 3.2.

365-day calendar dates. The Mesoamerican 365-day calendar date (0 G) which is implied in Figure 3.2 also may be unfamiliar because of its use of a capital letter for the name of the month, its use of 18 months of 20 days each, its use of a 5-day epagomenal period as a 19th month, and its counting of the days in each month from the "seating" of the month (usually designated in modern scholarship with 0). In Figure 3.2, the months are labeled with capital letters because the ancient names of the months appear to be unknown. The capital letters sometimes may be associated with the month names of much later calendars, but even the later month names are

[183] Ibid., 97-101, 111-25, 167.

"poorly documented", "obscure", and "often archaic".[184] The 18 capital letters representing 20-day months range from A through R. The 5-day resting month is represented by the letter X. In Edmonson's proposed calendrical genealogy, the position of month X varies with respect to its associated 18 months. Sometimes month X is deemed to follow the 18 months (as in the Pre-Cuicuilco calendar) and sometimes it is deemed to precede its associated 18 months (as in the Cuicuilco calendar discussed in the following Section). In the Pre-Cuicuilco calendar year depicted in Figure 3.2, month X is inferred to be the 19th or final month of the year because of the calendar reform that Edmonson proposed for 739 BCE.

Julian day numbers. The relatively modern use of Julian day numbers provides "a running count of days that starts at noon on January 1, 4713 BCE of the [proleptic] Julian Calendar. The date changes at noon, Greenwich (Universal) Time. It is widely used for astronomical observations … so as to avoid calendrical confusion and to allow for easy subtraction of dates."[185] In the following discussions referring to proleptic calendar dates, Julian day numbers often are included for clarity and they are placed within parentheses.

Year bearers. Every month in the Pre-Cuicuilco calendar year shown in Figure 3.2 begins with the same sacred day name or god of the year as the first day or name day of the year. In this year, the sacred name was Lord (letter t). This god was known as the "year bearer", in part, perhaps, because his name occurred on the "seating" day of every month of the year. For the previous three years, the year bearers were Serpent, Foot, and Eagle. If the year bearer Lord had been followed by another of the same type of 365-day calendar year, the year bearer would have been Serpent again. Throughout the entire calendrical genealogy examined by Edmonson, various calendar innovations occurred that changed the year bearers of the associated calendars. He identified the repeating consecutive year bearers Serpent, Foot, Eagle, and Lord as Type V because of their respective positions in the list of sacred day names that begins with Sun. The 20 possible Olmec names of the year bearers and their five separate types are set forth below.[186]

Type	Repeating consecutive year-bearers			
I.	a. Sun	f. Death	k. Monkey	p. Owl?
II.	b. Wind	g. Deer	l. Jaw	q. Quake
III.	c. Night?	h. Star?	m. Cane	r. Flint
IV.	d. Hard?	i. Water	n. Jaguar	s. Rain
V.	e. Serpent	j. Foot	o. Eagle	t. Lord

Summer solstice. One other day in Figure 3.2 is marked with a thick line box, the 162nd day of the year (6 Sun). On this auspicious day and presumably with the sanction and involvement of local leaders, the priest-astronomers created a new calendar. Month X was moved from its originally expected position after month F to a new position immediately before day 6 Sun, which was the summer solstice and the only day named 6 Sun in this Pre-Cuicuilco calendar year. Since 6 Sun was the day that now followed the repositioned month X, 6 Sun became the New Year (Type I) of the new calendar. From this day forward, a solar era based on the summer solstice could be measured.

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[184] Ibid., 214-20.

[185] "Julian Date", accessed at stars.astro.illinois.edu/sow/jd.html.

[186] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 8, 169.

Terminal naming. If the new calendar year had been initially named, its year bearer would have been the god named Sun. However, the Pre-Cuicuilco calendar was reformed even further by switching from initial naming to terminal naming. By these calendar reforms (month X repositioned and terminal naming), the priest-astronomers effectively added six days (or six suns) to what Edmonson considered to be their projected length of the new 1507-year summer solstice era. The reforms changed what may have been decades, perhaps even more than a hundred years, of solar observation focused on the fall equinox,[187] with its attendant calendar maintenance, record keeping, and astronomical prediction. However, the adoption of terminal naming meant there was a continuance of Type V name days. Every month in the first new calendar year ended on the day Lord (letter t).

According to Edmonson's theory, the new calendar implemented the priest-astronomers' then-current calculation of the summer era (550426 days = 1507 solar years).[188] In effect, but without the use of fractions, they might have calculated the length of the tropical year to be about 365.24618 days, some 5.7 minutes longer than the modern estimate of about 365.242188 days. This small error, over time, would have meant that even this alignment of calendar and summer solstice would need to be reformed. Still, the accuracy of the proposed calculation suggests the dedicated interest of Mesoamerican priest-astronomers, and the leaders and peoples who supported them, in the astronomy of the sun over many years leading up to the summer solstice calendrical reform of 739 BCE.

3.10.2 Misalignment of the 365-day calendar and tropical year

With a mathematical calendar consisting of just 365 days, Mesoamerican priest-astronomers were faced with the same problem that Roman calendar reformers attempted to solve hundreds of years later. In the Roman Empire, the expected difference between the tropical year and the reformed or "Julian" calendar[189] was handled by requiring that a "leap" day be added to the new calendar every four years.[190] This reform apparently was intended to keep the relationship of solar events, such as solstices, equinoxes, and zenith passages, in relatively stable positions vis-à-vis the calendar days and months. However, the leap-day reform resulted in 20 days (nearly two-thirds of a day too much) being added to the Julian calendar every 80 years. In 1582 CE, the Gregorian calendar reform remedied this miscalculation. In the Gregorian system, February is assigned a 29th day every four years, but only in century years that are evenly divided by 400; e.g., 1600, 2000, and so forth. Nearly 500 years after the Gregorian leap-year reform, the western calendar is still based on that recalculation of the relationship between the calendar and sun.[191]

Mesoamericans, at some point, seem to have adopted the opposite method for keeping the calendar and sun connected. This "anti-leap-year" system assumed that a 20-day month had been

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[187] Ibid., 99, 114-15.

[188] Ibid., 111-16.

[189] The new Roman calendar was named for Julius Caesar, who proposed the reform in 46 BCE. *The Compact Edition of the Oxford English Dictionary*, I: 1520 (Julian). See also Aveni, *Empires of Time*, 114-15; Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 188-89, 192-93.

[190] Systematic implementation of the reform did not occur for more than five decades. See, e.g., "Julian calendar", *Encyclopaedia Britannica*, accessed at britannica.com/science/Julian-calendar; Alexander Jones, "Calendrica II: Date Equations from the Reign of Augustus," *Zeitschrift für Papyrologie und Epigraphik* 129 (2000) 159-160, accessed at uni-koeln.de/phil-fak/ifa/zpe/downloads/2000/129pdf/129159.pdf.

[191] See, e.g., "Gregorian calendar", *Encyclopaedia Britannica*, accessed at britannica.com/topic/Gregorian-calendar; Roscoe Lamont, "The Reform of the Julian Calendar," *Popular Astronomy* 28 (1920) 18-32, accessed at ui.adsabs.harvard.edu.

subtracted or erased from the measurement of their 1507-year solar era after 82 years and 230 days. They apparently determined that 1508 of their 365-day calendar years (550420 days) could be equated almost exactly with 1507 tropical years, which Edmonson proposed they mistakenly projected to be 550426 days. As a result, over that lengthy solar era, a 6-day correction was first made and then one 365-day calendar year would need to be subtracted over 1507 solar years. As a practical matter, the priest-astronomers seem to have founded new 365-day calendars from time to time, based at least in part on their knowledge about the start and predicted end of the 1507-year solar era and their then-current solar observations. This does not mean that the previous calendars fell out of use immediately or everywhere, but over time the newer calendars gradually became understood and accepted.[192]

3.10.3 The 365-day "Cuicuilco" calendar

According to the calendrical genealogy reconstructed by Edmonson and depicted in Figure 3.3, the inauguration of the provisionally named "Cuicuilco" calendar occurred on the summer solstice, 22 June 739 BCE 6 Sun [0 C Cuicuilco calendar = 4 C Tikal calendar] (1451684). However, as Figure 3.4 indicates, the new 365-day calendar actually began its count of days five days earlier on 1 Owl? [0 X Cuicuilco calendar = 19 B Tikal calendar] and it ended its count with a 365th or concluding day on 1 Lord [19 B Cuicuilco calendar = 18 B Tikal calendar]. The 5-day month X had been moved forward in time from its expected position after month F in the Pre-Cuicuilco calendar to a position just before month C in the Cuicuilco calendar year. In accordance with prior practice placing the New Year immediately after month X, the New Year of the Cuicuilco calendar became the summer solstice, 6 Sun. The New Year was Type I and the next three New Years also were Type I (Death, Monkey, and Owl?). Then the four-year sequence of Type I New Years for the Cuicuilco calendar began to repeat.

As a result of the new placement of month X, the first day of each month did not have the same sacred name, but the last day of each month did. By adopting terminal naming, the priest-astronomers created a new calendar that ended each of the months with the same name, the same god. The year bearer of the first year in the Cuicuilco calendar remained a Type V day named Lord. The full name of the day, 1 Lord, was the same as the full name of the day that had begun the related Pre-Cuicuilco calendar year (Figure 3.2). The next three year bearers of the Cuicuilco calendar also were Type V (Serpent, Foot, and Eagle). Then the four-year sequence of Type V year bearers for the Cuicuilco calendar began to repeat.

Since the name day of each 365-day Cuicuilco calendar year had four possible year bearers and 13 possible numerical coefficients (4x13 = 52), a name day identified as 1 Lord 19 B did not repeat until all 52 combinations had occurred (52x365 = 18980 days). This 18980-day cycle of the adjoined names and numbers of the 260-day and 365-day calendars has been referred to as the "Calendar Round". Thus, in 687 BCE, 52 365-day calendar years after the inauguration of the Cuicuilco calendar, a terminally named year ended on 1 Lord [19 B Cuicuilco calendar]. The second Cuicuilco Calendar Round began on the next day, 1 Owl? [0 X Cuicuilco calendar] and the New Year again was 6 Sun [0 C Cuicuilco calendar].

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[192] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 111-17.

During the first Cuicuilco Calendar Round, the summer solstice gradually moved later into month C because the tropical year was about 5.81 modern hours longer than the 365-day calendar year. By the beginning of the second Cuicuilco Calendar Round in 687 BCE, the difference between tropical year and calendar year had aggregated about 12.594 days and, by the beginning of the 84th Cuicuilco calendar year, the summer solstice was more than 20 days (about 20.102 days) later in the calendrical measurement of time. The summer solstice then fell on day 0 D and month C had been entirely displaced from its connection with the summer solstice.

3.10.4 The projected "Cuicuilco" summer era

Edmonson noted that it was "not clear" how the originators of the Cuicuilco calendar "reached the erroneous conclusion that the era was 6 days longer than it was." He recognized that the "observation of the 186 days from the spring to the fall equinox" may have been involved in the considerations of the priest-astronomers and he stated that "[i]n the Middle Preclassic [the seventh, sixth, and fifth centuries BCE] … [t]he relative stability of the summer semester [of 186 days] appears to have been an important aspect" of the Cuicuilco calendar creation. However, he also thought it seemed "unlikely that a calendar would have been based on simply ignoring the shorter winter semester (of 179 or 180 days). This is, nonetheless, the nature of the error."[193] Edmonson's apparent assumptions that the priest-astronomers somehow divined an accurate 1508-year solar era and that they then must have reached an "erroneous conclusion" to add six days to that era are not required to explain the Cuicuilco calendar addition of six days.

Edmonson also suggested that the "error" had something to do with "a precession rate", the rate at which the calendar date of an initial solar event, such as a summer solstice, comes to precede the actual solar event over some period of time. In accordance with his assumptions about a solar era of 1508 calendar years plus six days, he concluded that the implied average solar year (365.2462 days) "would correspond to a precession rate of 93 days every 377 years, or 186 days every half era (754 years)", which would imply a complete precession rate of 372 days every solar era (4x377 = 1508 years).[194] The number 372 may be calculated easily as 7 more than 365; so, based on this logic, the 6-day addition would have been too little. None of these proposed justifications for the 6-day addition are adequate.

The actual precession rate for observed solar events and a 365-day calendar is about 5.81 hours every 365-day calendar year or about 91.306 days every 377 calendar years (377x365 = 137605 days vs. 377x365.242188 = 137696.306 days). Such observational realities would seem to have governed the simple counting issues before the priest-astronomers. When their use of a continuously repeating 365-day calendar was firmly interlocked with their 260-day calendar, the average year length of an observational year may have quickly become apparent as being more than 365 days. As the years passed, the average length of four observational years almost always would have been perceived as more than 4x365 = 1460 days. The actual period is about 1460.969 days. The average length of 13 observational years always would have been measured as more than 13x365 = 4745 days. The actual period is about 4748.148 days. The typical length of 20 observational years always would have been counted as more than 20x365 = 7300 days. The actual period is about 7304.844 days. At what point in the process of observing, counting by

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[193] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 113-114.

[194] Ibid.

natural days, recording intervals, and examining the records did the priest-astronomers obtain a relatively accurate commensuration between a count of days and the observation of a recurring solar event? And as more years passed, how did they adjust their calendar to account for their hypothetical solar era that proved to be too long or too short?

Edmonson also proposed that "the original intuitive grasp of the era" may have been "a numerological rather than an astronomical discovery". He suggested that by paying close attention to the interweaving of the 13-day and 20-day cycles, the priest-astronomers may have recognized various repetitions in day names and their recurring patterns over a period of 7540 days (20 365-day years and 240 days). This nearly 21-year repetition begins with a steady count of 13-day cycles: 13x4 = 52; 52x29 = 1508; 1508x5 = 7540. If this numerological day counting sequence commences on a specific day, such as 1 Lord (the name day of the respective years of the Pre-Cuicuilco and Cuicuilco calendars when the new calendar was inaugurated), in 1508 days the count reaches 1 Star?, another 1508-day count reaches 1 Owl?, a third reaches 1 Hard?, a fourth reaches 1 Jaw, and the fifth 1508-day count reaches 1 Lord, where the whole pattern could begin again. In other words, every 7540 days, not only does this numerological count of the 13-day cycle repeat itself, but the count of the 20-day cycle does so as well: 7540 = 4x5x13x29 = 4x1885 = 5x1508 = 13x580 = 20x377 = 52x145 = 260x29.[195]

Edmonson's distinction between the precedence of numerological discoveries over astronomical discoveries may be more conceptual than real. More likely, the daily and nightly astronomical observations were intertwined with the 260-day calendar and eventually with the 52-year Calendar Round. For priest-astronomers faithfully observing and recording the movements, positions, and phases of the moon, a period of 7540 days would have represented a shorter close commensuration with the length of 276 mean sidereal months (about 7540.778 days). If a single day is then added, so as to account for the longer close commensuration (a Mesoamerican type of "leap day"), the next 7540-day cycle would begin with 2 Sun and the five repeating 1508-day cycles would reach 2 Water, 2 Quake, 2 Serpent, 2 Cane, and then 2 Sun again. The count of days would have reached 15081 days, while the sidereal month observations may have required 15082 days (the mean period is about 15081.556 days); so, another one-day advance or leap day may have been suggested. The third 7540-day cycle would begin with 3 Wind and in consecutive 1508-day cycles it would reach 3 Foot, 3 Flint, 3 Death, 3 Jaguar, and then 3 Wind again. The day count would have reached 22622 days, while the sidereal month count reached about 22622.334 days and a third one-day advance may have been made. The fourth 7540-day cycle would begin with 4 Night? and in 1508-day cycles it would reach 4 Monkey, 4 Rain, 4 Deer, 4 Eagle, and then 4 Night? again. The day count would have reached 30163 days, while the sidereal month count reached about 30163.113 days and a fourth one-day advance may have been undertaken. The fifth 7540-day cycle would begin with 5 Hard? and in consecutive 1508-day cycles it would reach 5 Jaw, 5 Lord, 5 Star?, 5 Owl?, and then 5 Hard? again. The day count would have reached 37704 days, while the sidereal month count reached about 37703.891 days. No one-day advance would have been suggested after 1380 sidereal months and more than 103 solar years had been observed, counted, recorded, and studied. However, after the following 7540-day cycle, the pattern probably would have suggested another one-day advance, to 45245 counted days vs. 1656 sidereal months or 45244.669 days. This

[195] Ibid.

possible repetition of 7540-day cycles and close accords with observed periods of 276 sidereal months is consistent with Mesoamerican priest-astronomers' "preoccupation with 'commensurateness'—perfecting the way time cycles interlock and fit together".[196]

A partial list of six such one-day advances, as part of consecutive 7540-day cycles, is set forth below to indicate more clearly their numerological pattern.

1 Lord	1 Star?	1 Owl?	1 Hard?	1 Jaw	1 Lord
2 Sun	2 Water	2 Quake	2 Serpent	2 Cane	2 Sun
3 Wind	3 Foot	3 Flint	3 Death	3 Jaguar	3 Wind
4 Night?	4 Monkey	4 Rain	4 Deer	4 Eagle	4 Night?
5 Hard?	5 Jaw	5 Lord	5 Star?	5 Owl?	5 Hard?
6 Serpent	6 Cane	6 Sun	6 Water	6 Quake	6 Serpent

In comparison with the list of sacred day names in Table 3.F, this list indicates that the name of the initial day advances by eight in the list of 20 repeating names during each 1508-day cycle, e.g., Lord, Star?, Owl?, etc. Of course, when the advancing 7540-day pattern eventually begins and ends with 13 Jaw, the next 7540-day pattern would begin and end with 1 Cane. The associated numbers advance by 1 with each leap day advance, but there are only 13 sacred numbers to use in this interwoven pattern of the 260 sacred days and sidereal months.

The predicting power of a 7540-day cycle with respect to the moon may have suggested that a similar cycle might be discovered in the records with respect to the sun. Such a cycle could be long because a solar year is more than 13 times as long as a sidereal month. Indeed, a 52-year numerological (and astronomical) cycle is suggested in Edmonson's attempt to explain the Cuicuilco calendar's unique features: a summer solstice era, terminal naming, and a six-day addition to the length of the solar era.[197] In his proposed cycles of Calendar Rounds (52 365-day years), the 13 repeating 1460-day periods change their beginning days every four years in a consistent numerological pattern.

With the 7540-day cycles associated with sidereal months, the pattern of recording close commensurations led to 1508-day periods in which the numerical coefficient remained stable and the day name varied in a repetitive pattern, e.g., Lord, Star?, Owl?, Hard?, Jaw, Lord, Star?, Owl?, Hard?, etc. The numbers and names usually advanced by the use of a leap day when a longer close accord with sidereal months was considered. With a cycle of 52 365-day years, the count includes 18980 days, but a 52-year solar period involves about 18992.59378 days. Hence, 12 more days would be needed to reach a shorter close accord and 13 more days would be required to reach a longer close accord with the observed 52-year solar period.

Within the 18980-day calendrical count, the initial day designation advances every four years. If the count begins with 1 Lord as day 1, then after 4x365 = 1460 more days, the initial day designation is 5 Lord, after 2920 days the initial day designation is 9 Lord, and so forth, in a repeating pattern where the day name remains stable for each of the 13 four-year periods and the 13 numerical coefficients are variable: 1, 5, 9, 13, 4, 8, 12, 3, 7, 11, 2, 6, 10, and then 1, 5, 9, etc. for the next 52-year cycle. The numerical coefficients advance by 4 with each 1460-day cycle. A list of the advancing numbers and invariant name of the initial days of the 13 1460-day cycles in this possible 52-year calendrical cycle are set forth below.

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[196] Aveni, *Empires of Time*, 191.

[197] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 114.

Cycle	Days	Years	Total days	Solar period
1 Lord	1460	4	1460	1460.969
5 Lord	1460	8	2920	2921.938
9 Lord	1460	12	4380	4382.906
13 Lord	1460	16	5840	5843.875
4 Lord	1460	20	7300	7304.844
8 Lord	1460	24	8760	8765.813
12 Lord	1460	28	10220	10226.781
3 Lord	1460	32	11680	11687.750
7 Lord	1460	36	13140	13148.719
11 Lord	1460	40	14600	14609.688
2 Lord	1460	44	16060	16070.656
6 Lord	1460	48	17520	17531.625
10 Lord	1460	52	18980	18992.594

The problem with this numerological or calendrical 52-year cycle is that it is nearly one day short of the solar period in every four years and, in the aggregate, it is 12 to 13 days shorter than the 52-year solar period. With the 7540-day sidereal month cycle, a longer close accord (7541st day or leap day) may have been added to the shorter close accord (7540th day) and a new 7540-day cycle may have been measured from the longer close accord. This pattern of sequential 7540-day periods would have kept the numerological and astronomical cycles synchronized for more than 103 solar years (nearly two Calendar Rounds), at which time a decision to forego a leap day would have seemed to reset the pattern of sidereal months for another lengthy period.

With the 52-year solar cycle, a close accord with the solar event being measured does not occur until 12 or 13 days are added to the initial count of the Calendar Round (18980 days). Thus, 12 or 13 leap days may have been calculated in the records, one at a time, at the conclusion of each 1460-day cycle. This approach is similar to that suggested above for observations of sidereal months and 7540-day cycles: assume a leap day in the records after each calendrical cycle if the leap day will represent the longer close accord with the astronomical cycle. The systematic, lockstep, calendrical count (260x365) did not change in the slightest; however, because of the repeating calendrical patterns, the records could be used to track and predict sidereal months and solar events like solstices, equinoxes, and zenith passages. The numerological or calendrical result of adding 13 leap days (one after each of the 13 1460-day cycles in the 52-year solar cycle) is depicted in the following list, which also begins with 1 Lord as day 1 in this 52-year solar cycle.

Cycle	Days	Years	Leap days	Total days	Solar cycle days
1 Lord	1460	4	1	1461	1460.969
6 Sun	1460	8	1	2922	2921.938
11 Wind	1460	12	1	4383	4382.906
3 Night?	1460	16	1	5844	5843.875
8 Hard?	1460	20	1	7305	7304.844
13 Serpent	1460	24	1	8766	8765.813
5 Death	1460	28	1	10227	10226.781
10 Deer	1460	32	1	11688	11687.750
2 Star?	1460	36	1	13149	13148.719
7 Water	1460	40	1	14610	14609.688

Cycle	Days	Years	Leap days	Total days	Solar cycle days
12 Foot	1460	44	1	16071	16070.656
4 Monkey	1460	48	1	17532	17531.625
9 Jaw	1460	52	1	18993	18992.594

In this clear and simple pattern, the day names advance by one every four years and their numerical coefficients advance by 5.

Presumably, another approach that the priest-astronomers may have taken to their records could have been to count the 1460-day cycles consecutively (as in the initial list of such cycles above) and then to add a 13-day "leap period" at the end of the 52-year calendrical cycle. In their study of the records, they likely could have tested each of the leap day or leap period alternatives (single day advances or period advances, 12 day advances or 13 day advances) in connection with their astronomical records. For example, if 13 days are added as a leap period at the end of a 52-year calendrical cycle that begins on 1 Lord, so as to reach a longer close accord with the solar cycle, the next 52-year calendrical cycle begins with 1 Cane and keeps the name Cane as the initial name of each 1460-day cycle, and the 13 numerical coefficients for the 1460-day periods repeat as with the initial list of such cycles: 1, 5, 9, 13, etc. However, if only 12 days are added as a leap period at the end of a 52-year calendrical cycle that begins on 1 Lord, so as to reach a shorter close accord with the solar cycle, the next 52-year calendrical cycle begins with 12 Jaw and keeps the name Jaw as the initial name of each 1460-day cycle, and the 13 numerical coefficients for the 1460-day periods repeat as with the initial list of such cycles set forth above, but with a different starting numeral: 12, 3, 7, 11, 2, etc.

The trouble with a proposed records analysis system that uses the insertion of 13 individual leap days or a 13-day leap period to synchronize the calendar and solar cycles is that the system adds too much time to each 52-year solar cycle. After two 52-year solar cycles have been completed by the addition of 13 days to each 18980-day period, the count of days would be 2x18993 = 37986 days, but the observed solar cycle would be just 2x18992.594 = 37985.188 days, nearly a one day difference. After five such 52-year cycles (a solar era of 260 years), the alternative of adding 13 days to each 52-year calendar cycle would result in the count of days being two full days longer than the solar period: 5x18993 = 94965 days vs. 260x 365.242188 = 94962.969 days.

Similarly, the problem with a proposed system that uses the insertion of 12 individual leap days or a 12-day leap period to synchronize the calendar and solar cycles is that the system adds too little time to each 52-year cycle. After two 52-year cycles have been completed by the addition of 12 days to each 18980-day period, the count of days would be 2x18992 = 37984 days, but the solar cycle would be 2x18992.594 = 37985.188 days. The short calendrical count would be obvious. In a solar era of 260 years or five 52-year cycles, the alternative of adding 12 days to each 52-year calendar cycle would result in the count of days being almost exactly three days shorter than the solar period: 5x18992 = 94960 days vs. 260x365.242188 = 94962.969 days. The difference between 3 days and 2.969 days is about 44.6 minutes.

The decision to add six days at the beginning of a summer solstice era measured with the Cuicuilco calendar is consistent with the numerological and astronomical alternative of adding 12 days to a period of 52 365-day calendar years. The decision implies a predicted 520-year solar era (739 to 219 BCE) yet to be confirmed by observation. Ten 52-year solar measurements appear to have been expected to end on the summer solstice in 219 BCE: (10x18992) +6 = 189926 days. The mean tropical year implied by this equation is about 365.242308 days, some

10.4 seconds longer than the modern estimate of 365.242188 days. It would appear that the count of days reached 22 June 219 BCE 2 Deer [6 I Cuicuilco calendar = 10 I Tikal calendar] (1641610) when a full 520 tropical years (189926 days) had passed after the inauguration of the Cuicuilco calendar in 739 BCE.

By the time of the summer solstice in 739 BCE, the numerological patterns and the solar year misalignments from the calendar counts suggested above seem to have been observed, measured, recorded, and studied by the priest-astronomers long enough to make the proposed 520-year prediction. Had a complete 260-year period of five Calendar Rounds been completed by 739 BCE? That may be unlikely. Had the priest-astronomers intensively studied the numerological and astronomical patterns for enough years that they could predict what their effects would be over a complete 260-year period? That seems more likely. Whatever the actual events may have been, the addition of six days to the proposed 520-year Cuicuilco solar era at the inauguration of the Cuicuilco calendar need not be considered "erroneous". Indeed, the Cuicuilco calendar and its proposed 520-year solar era probably could be considered a brilliant achievement in the history of astronomy, a testament to the dedicated service of generations of Mesoamerican priest-astronomers and the cooperation of their communities.

3.10.5 The 365-day "Olmec" calendar

In 656 BCE, the achievements of 739 BCE appear to have been eclipsed by another numerological and astronomical achievement. The solar era of 1508 365-day calendar years (550420 days) appears to have been understood as the length of 1507 solar years (about 550419.977 days) and to have been evidenced by the inauguration of a new calendar. In accord with the proposed anti-leap-year system of dealing with the misalignment between the 365-day calendar and the length of the solar year, the priest-astronomers appear to have inaugurated a calendar to mark the time when the precession of the summer solstice had reached 20 days in the Cuicuilco calendar count. Figure 3.3 also includes this part of the calendrical genealogy. Figure 3.5 depicts the Cuicuilco calendar year in which the 20-day anti-leap-year adjustment occurred. Late in the year, when month B was expected to occur, month X was moved into its position. In other words, month X was moved one 20-day month earlier in the solar era. Edmonson described the calendar adjustment as moving month X "back 1 month".[198] The mean tropical year suggested by the close accord of 1508 calendar years and 1507 tropical years is about 365.242203 days, some 1.3 seconds longer than the modern estimate of 365.242188 days.

Edmonson provisionally named the new calendar the "Olmec" one and proposed that its inauguration and New Year occurred on 13 May 656 BCE 4 Owl? [0 B Olmec calendar = 5 B Cuicuilco calendar = 4 B Tikal calendar] (1481959). Figure 3.6 depicts the first 365-day year of the new calendar. Comparing Figures 3.5 and 3.6, it is immediately apparent that Cuicuilco calendar month B, which normally would have occurred at the end of the 83rd Cuicuilco calendar year, has been subtracted and a different month B (in terms of its sacred day names) appears as the first 20-day month of the Olmec calendar year. The new Olmec calendar evidences the chronological fact that the New Year of the Cuicuilco calendar had become misaligned with the summer solstice in 656 BCE by a full 20-day month. Eighty-three calendar years (83x365 = 30295 days) from the summer solstice of 739 BCE only extended to 2 June 656

[198] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 116.

BCE 11 Owl? [0 C Olmec calendar = 0 C Cuicuilco calendar = 4 C Tikal calendar] (1481979), 20 days before the summer solstice on 22 June 656 BCE 5 Owl? [0 D Olmec calendar = 0 D Cuicuilco calendar = 4 D Tikal calendar] (1481999).

The New Year in this first Olmec calendar year is 4 Owl?; so, the New Year in each Olmec calendar year continued the Cuicuilco calendar format of using Type I days (Owl?, Sun, Death, Monkey). The name days in this first terminally named Olmec calendar year are 12 Eagle; so, the year bearers of the Olmec calendar also continued the Cuicuilco calendar format of using Type V days (Eagle, Lord, Serpent, Foot). Edmonson acknowledged that this "anti-leap-year 'correction' was not in fact a correction at all". Mesoamerican calendars were "allowed to run" their respective courses.[199] The Pre-Cuicuilco calendar may have still been in use. The Cuicuilco calendar appears to have continued to be measured at least until the inauguration of the Zapotec calendar, which Edmonson placed in 305 BCE. The Olmec calendar seems to have continued to be measured for thousands of years. In 1522 CE (2178 years after the Olmec calendar was inaugurated), a date in the calendar appears to have been cited in a "post-Conquest" document.[200] Thus, the Olmec calendar's relationship to later calendars seems to have been understood, maintained, and recorded, even though it had long before completed any continuing numerological or astronomical use it may have had for measuring and documenting a 1507-year solar era related to the summer solstice.

The solar era numerological pattern related to the Olmec calendar also appears to parallel the sidereal month numerological pattern discussed in Section 3.10.4 above. The lunar pattern was 7540 = 4x5x13x29 = 4x1885 = 5x1508 = 13x580 = 20x377 = 29x260 = 52x145. The application of this numerology appears to have been extended to solar years. Hence, this more accurate solar era may be understood as 73x7540 = 550420. Unlike the calendrical numerology connected with 276 sidereal months and 260 tropical years, the solar era of 1508 365-day years or 1507 tropical years required no attention to leap days or leap periods. This exact pattern suggests that 1508 365-day calendar years may be seen as a component of a much longer solar era of 5x1508 = 7540 calendar years or 7535 tropical years (7540x365 = 2752100 days vs. 7535x365.242188 = 2752099.887 days). The proposed Olmec calendar documents the priest-astronomers' dedication and developing expertise over hundreds of years of observation, measurement, record keeping, and analysis.

3.10.6 The 365-day "Izapa" calendar

Figure 3.3 also includes a provisionally named "Izapa" summer era calendar, which may have been derived from the mathematics, astronomy, and summer solstice origin of the Cuicuilco calendar and its proposed 520-year era. Edmonson suggested the possibility of two consecutive 219-year periods associated with the era, which may imply the equation (2x219) +82 = 520. In this alternative calculation of the 520-year Cuicuilco solar era, 52 leap days or a 52-day leap period may have been calculated as another way of measuring the misalignment of tropical years and Calendar Rounds; however, four Calendar Rounds (4x18980 = 75920 days) plus 52 days is almost two days more than 208 solar years: 75972 calendar days vs. a solar period of about 75970.375 days. Over the next 11 calendar years, the difference between calendar and solar

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[199] Ibid.

[200] Ibid., 65, 117, 231.

periods gradually diminishes if no additional leap days are added. For example, in 212 calendar years, the difference shrinks to 77432 calendar days (leap days included) vs. 77431.344 days in the solar period. However, in 216 calendar years, the difference begins to expand again to 78892 calendar days (leap days included) vs. 78892.313 days in the solar period. At the end of 219 solar years (about 79988.039 days), the calendar measurement reaches 79987 days (leap days included) and an additional one-day advance or leap day is required for a close accord. Edmonson proposed that at that point, the calendar advance occurred and thereby changed the New Year from Type I to Type II).[201] The mathematics and solar astronomy match this proposal: (219x365) +53 = 79988 days vs. 219x365.242188 = 79988.039 days. The day count is about 56.2 minutes less than the solar period. The mean tropical year implied by this accord is about 365.242009 days, some 15.5 seconds shorter than the modern estimate of 365.242188 days.

Edmonson suggested that the Izapa calendar was inaugurated about 219 365-day years after the Cuicuilco calendar was installed. Figure 3.7 depicts the first 365-day year of the Izapa calendar. The 219th Cuicuilco calendar year ended on its 365th day, 24 April 520 BCE 11 Foot [19 B Cuicuilco calendar = 18 B Tikal calendar] (1531613). Month X of the 220th Cuicuilco calendar year was seated on the following day. However, month X of the first Izapa calendar year was seated one day later. The 220th Cuicuilco New Year occurred on 30 April 520 BCE 4 Owl? [0 C Cuicuilco calendar = 4 C Tikal calendar] (1531619), which was 53 days before the summer solstice on 22 June 520 BCE 5 Water [13 E Cuicuilco calendar = 17 E Tikal calendar] (1531672). Because of the one-day advance, the first Izapa New Year occurred on 1 May 520 BCE 5 Quake [0 C Izapa calendar = 1 C Cuicuilco calendar = 5 C Tikal calendar] (1531620).

The New Year in this first Izapa calendar year was 5 Quake; so, the New Year in each Izapa calendar year changed the Cuicuilco calendar format and instead used Type II days (Quake, Wind, Deer, and Jaw). The name days in this first terminally named Izapa calendar year were 13 Owl?; so, the year bearer of the Izapa calendar year also changed the Cuicuilco calendar format and instead used Type I days (Owl?, Sun, Death, and Monkey).

About 215 years after the Izapa calendar was inaugurated, a summer era, Type III New Year, terminally named calendar may have begun in connection with another one-day advance. For the provisionally named "Zapotec" calendar, the advance seems to have occurred about four-years earlier than might have been expected, apparently seven years into the 11-year period in which the solar and calendar counts were being closely coordinated. Edmonson assigned the date of 10 March 305 BCE 13 Cane [0 C Zapotec calendar = 1 C Izapa calendar = 2 C Cuicuilco calendar = 5 C Tikal calendar] (1610096) for the inauguration of the Zapotec calendar.[202] The inaugural timing of this calendar four years "too early" may indicate an acknowledgement of the accuracy and simplicity of the summer era represented by the Olmec calendar adjustment in 656 BCE and a formal abandonment of the Cuicuilco solar era.

3.10.7 The 365-day "Kaminaljuyu" calendar

Edmonson assumed that a six-day error had occurred in the priest-astronomers' prediction of the solar era when the Cuicuilco calendar was inaugurated, and that the Olmec calendar had continued the error. Based on these assumptions, he proposed that the inauguration of the first of

[201] Ibid., 114.

[202] Ibid., 117.

the accurate 1507-year solar eras would be represented by a spring era calendar that was initiated between the inaugurations of the Olmec summer era calendar and the much later spring era calendars of Teotihuacan and Tikal. Edmonson referred to this hypothetical calendar as "Calendar C". The likely initiation date for Calendar C would seem to have occurred on the spring equinox, 21 March 433 BCE 7 Jaw [0 B Calendar C = 5 B Izapa calendar = 1 B Olmec calendar = 5 B Tikal calendar] (1563355).[203]

The preceding analysis in this study suggests, however, that there was no error in the predicted Cuicuilco summer era (a 520-year era) or in the lengthening of the era to 1507 solar years, as reflected by the Olmec calendar adjustment. Hence, Calendar C would not appear to have been the first to document a 1507-year solar era. Instead, Calendar C appears to have been the first to apply the accurate length of the Olmec summer era to the spring equinox. As the first of the spring era calendars, Calendar C would have been the ancestor of the later spring era calendars that Edmonson named Teotihuacan (165 BCE), Tikal (84 CE), Quiche (395 CE), and Campeche (568 CE).[204]

Edmonson also proposed that the existence of Calendar C was documented on a severely and intentionally damaged, carved stone artifact, which had been found at Kaminaljuyú in the Valley of Guatemala and labeled Stela 10. Hence, he provisionally named Calendar C the "Kaminaljuyu" calendar Nonetheless, caution should be suggested with respect to his proposed interpretation of the oversize dates appearing on Stela 10. While his suggested calendrical genealogy appears to be consistent with modern calculations of ancient solar phenomena and with the coordinated lockstep progression of the 260-day and 365-day calendars that systematized the Calendar Round, the genealogy is not well documented in the Preclassic period. His interpretations of the calendrical equivalents in Stela 10 (7 Wind Kaminaljuyu calendar = 8 Wind Teotihuacan calendar = 1 Lord Olmec calendar) are based on his reading of two partially legible oversize glyphs (7 Wind and 8 Wind) that other Mayanists have read differently, and on his analysis of a largely destroyed full-bodied hieroglyph day name (1 Lord) that other Mayanists have suggested may represent a female. Although Stela 10 apparently has not yet been interpreted in a definitive manner, the Cuicuilco calendar New Year 6 Sun (as 6 *Imix* or Alligator) seems to appear in one of the blocks of small glyphs on Stela 10, as does the distance number 15 *winal* or 20-day month, which Edmonson noted was "the distance from the Olmec to the Teotihuacan New Year".[205] While Edmonson's reading of the oversize dates on Stela 10 may not evidence Calendar C directly, differing interpretations of Stela 10 also do not nullify the apparent need for at least one spring era calendar between the Cuicuilco and other summer era calendars and the Teotihuacan, Tikal, and subsequent spring era calendars. This study will refer to Calendar C as that of "Kaminaljuyu" (Edmonson's spelling) for clarity in discussing his calendrical genealogy.

Figure 3.8 shows the Olmec calendar year for 433-432 BCE, during which the Kaminaljuyu calendar apparently was inaugurated. This Olmec calendar year was a terminally named year in

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[203] Ibid., 25-27, 111-18, 189, 274-77.

[204] Ibid., 124-25.

[205] Ibid., 25-27. See, e.g., David F. Mora-Marin, "Kaminaljuyu Stela 10: Script classification and linguistic affiliation," *Ancient Mesoamerica* 16 (2005) 63-87, accessed at academia.edu/4398916/Kaminaljuyu_Stela_10_Script_Classification_and_Linguistic_Affiliation_Ancient_Mesoamerica_16_63_87; Jonathan Kaplan, "The Inciensio Throne and Other Thrones from Kaminaljuyú, Guatemala: Late Preclassic examples of a Mesoamerican throne tradition," *Ancient Mesoamerica* 6 (1995) 185-196, accessed at researchgate.net/publication/231770030_The_Inciensio_Throne_and_Other_Thrones_From_Kaminaljuyu_Guatemala_Late_Preclassic_examples_of_a_Mesoamerican_throne_tradition.

the Cuicuilco calendar format: the year began with month X, its New Year was 6 Monkey (Type I), and its name days were 1 Foot; so, the last day of each month was the year bearer Foot (Type V). However, for the priest-astronomers who were creating the 1507-year spring era, this Olmec calendar year barely began. The five days of Olmec month X and then the New Year or seating day for month B in the Olmec calendar all occurred in their regular order, but on the following day, the priest-astronomers declared another New Year and seating day for month B to begin the Kaminaljuyu calendar year. This New Year fell on the spring equinox of 433 BCE. Figure 3.9 depicts the first year of the Kaminaljuyu calendar.

Because month X of the Kaminaljuyu calendar was placed after the 360-day portion of the year, the priest-astronomers returned to initial naming of the year (as in the Pre-Cuicuilco calendar). The New Year and name day of the year was 7 Jaw (Type II like the Izapa calendar). The little New Year 7 Jaw occurred 260 days later, thereby dividing the year (as in the Pre-Cuicuilco calendar) into a 260-day portion followed by a 105-day portion. As with most of these proposed ancient calendars, the names of the Kaminaljuyu months are not known; so, they are labeled with the letters A through R for the 20-day months and with the letter X for the five-day resting month that concluded the calendar year. Each month began with the seating of a day named Jaw; so, for the entire existence of the Kaminaljuyu calendar, successive four-year periods were carried in order by Type II year bearers with the sacred names Jaw, Quake, Wind, and Deer.[206]

The spring era, Type II New Year, and initial naming features of the Kaminaljuyu calendar established a distinct split with the summer era, Type I New Year, and terminal naming features of the Cuicuilco and Olmec calendars. The Kaminaljuyu calendar seems to have derived its one-day New Year advance from the Olmec calendar, which had been established about 223 years earlier. However, the creators of the Kaminaljuyu calendar might appear to have waited about four years too long to accurately depict a 219-year solar cycle. As to the Izapa calendar, the Kaminaljuyu calendar timing was 87 years later, seemingly about four years too long to accurately depict a 20-day month adjustment in a Cuicuilco or Olmec calendar era. In the previous eight years, the spring equinox appears to have occurred on 10 Foot, 11 Eagle, 12 Lord, and 13 Serpent (Type V day names) and then on 2 Monkey, 3 Owl?, 4 Sun, and 5 Death (Type I day names); so, the choice to wait for 7 Jaw (the first Type II day name to occur with the spring equinox since 450 BCE) could have been planned well in advance. The timing of the Kaminaljuyu calendar initiation four years "too late" also may indicate an acknowledgement of the accuracy and simplicity of the summer era represented by the Olmec calendar adjustment in 656 BCE and a formal abandonment of the earlier, terminally named calendars.

According to Edmonson's reconstruction of Mesoamerican calendrical genealogy (Figure 3.3), during the 83rd Kaminaljuyu calendar year, a hypothetical "Calendar D" may have been inaugurated to recognize the 20-day difference that had accumulated between the Kaminaljuyu calendar and the spring equinox. He placed the New Year of Calendar D on 9 February 350 BCE 5 Deer [5 A Kaminaljuyu calendar = 5 A Izapa calendar = 6 A Olmec calendar = 5 A Tikal calendar]) (1593630). He also noted that this anti-leap-year (20-day) adjustment had been used previously to derive the Olmec calendar from the Cuicuilco calendar and the Kaminaljuyu calendar from the Izapa calendar. He proposed that Calendar D, even though undocumented at

[206] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 25-27, 117-18, 189.

the time (and perhaps even today), was a logical step in explaining the later derivation of the Teotihuacan and Tikal 365-day spring era calendars from the Kaminaljuyu calendar. However, before the creation of those later calendars transpired, "[t]he culmination of the development of the Preclassic calendar" occurred: "the invention" of the Long Count.[207]

3.11 The 360-day "Long Count" calendar

Sometime in the fourth or third century BCE, societies along the Pacific coast of southern Mexico and Guatemala and in the region west of Kaminaljuyú began to record their veneration of gods and political leaders not only with Calendar Round dates, but with dates in a new calendar system that, for at least two reasons, has come to be labeled the "Long Count". First, the priest-astronomers "customarily counted and recorded" intervals of 7200 and 144000 days. Second, its period, "usually called the Mayan era", lasted for more than 5125 tropical years. The Long Count solved a problem that the Calendar Round created for long term historical record keeping and veneration. With the Calendar Round, the same calendrical designation (such as 7 Jaw 0 B) could be given to different days that were 52-year intervals apart. The Long Count made it possible to distinguish these days.[208]

The temporal features on which the Long Count was founded have been described often with the Yucatec Maya words *k'in* (day, sun, or time), *winal* (related to the 20 fingers and toes of a human) and *tun* (stone). The Maya sometimes signified the completion of a tun or 360-day period by ceremoniously placing a stone on the ground. Twenty multiples of the tun (a *k'atun* or 7200 days) also were counted, along with 20 multiples of a k'atun (a *b'aktun* or 144000 days).[209] A single b'aktun represented 400 tun or 360-day calendar years, the equivalent of about 394.259 tropical years.

The numerical name given to each day in the Long Count usually was composed of the numbers (numerals or head variant glyphs) in its five numerical positions of the b'aktun, k'atun, tun, winal, and k'in. To record a specific date in this five-part place-value system, the Mesoamerican glyph for the figure zero was necessarily employed. While Mesoamericans often recorded a Long Count date in a vertical column,[210] in modern orthography the date is usually written horizontally. The numerical positions in a horizontal line start with the b'aktun on the left and each position is separated from the following one by a period: b'aktun.k'atun.tun.winal.k'in. A 13-b'aktun period, the "baktun cycle" or "Mayan era",[211] consists of 1872000 days or about 5125.366 tropical years. Hence, the day following the completion of one 13-b'aktun cycle begins another 13-b'aktun cycle. Somewhat like the 260-day and 365-day calendars, the Long Count appears to use the numbers 13, 18, and 20 to define its limits.

Edmonson proposed that the priest-astronomers who invented the Long Count (whom he referred to as "Olmec" rather than "Maya") were ones apparently familiar with what may have been the oldest Mesoamerican calendrical tradition. The 18 winal or 20-day months of every

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[207] Ibid., 118-21.

[208] Coe, *Breaking the Maya Code*, 62, 70, 108, 112-13; Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 194-96.

[209] Aveni, *Empires of Time*, 190-212; Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 194-96; Morley, *An Introduction to the Study of the Maya Hieroglyphs*, 60-63; Schele and Freidel, *A Forest of Kings*, 81-83.

[210] E.g., Aveni, *Empires of Time*, 192; Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 27-32.

[211] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 195.

fourth year in the Pre-Cuicuilco calendar were seated with a Type V New Year/year bearer named Lord, as shown in the example of a Pre-Cuicuilco calendar year in Figure 3.2. No other 365-day calendar appears to have had this Lord = New Year/year bearer/seating temporal combination. Similarly, each winal of the Long Count also began with a first k'in named Lord, which was signified by the glyph for zero. Edmonson noted that "Olmec and Mayan dates in the Long Count specify the baktun (from 0 to 12), the katun (from 0 to 19), the tun (from 0 to 19), the uinal (from 0 to 17), and the day (from 0 to 19)." Thus, he concluded, "[o]n this internal evidence alone, the Olmec invention of the Long Count seems self-evident."[212]

Edmonson further proposed that the inauguration of the Long Count was planned to occur not only on the last day of the associated Olmec calendar year named Lord, and not only on a day when an even tun date could be assigned (i.e., 0 winal and 0 k'in), but also on a day named 1 Lord in the 260-day calendar when an Olmec Calendar Round came to an end, i.e., on the last day of the last terminally named year in an Olmec Calendar Round. The ancient lockstep nature of the naming of 260 sacred dates, and the apparently later 365 days, and the still later proposed Long Count days meant that the priest-astronomers could have planned for this event many years in advance. According to Edmonson's calendrical genealogy, the day meeting these conditions was 8 June 355 BCE 1 Lord [0 A Pre-Cuicuilco calendar = 19 F Cuicuilco calendar = 19 F Olmec calendar = 18 F Izapa calendar = 18 F Kaminaljuyu calendar = 3 G Tikal calendar] (1591923) and the assigned tun date in the Long Count was 6.19.19.0.0.[213]

3.11.1 The 13-b'aktun period

With this intermediate calendrical position determined for 8 June 355 BCE, both temporal limits of the Mayan era may be calculated. This b'aktun period ended on the winter solstice, 21 December 2012 CE 4 Lord [0 C Pre-Cuicuilco calendar = 19 H Cuicuilco calendar = 19 H Olmec calendar = 18 H Izapa calendar = 18 H Kaminaljuyu calendar = 3 I Tikal calendar] 13.0.0.0.0 (2456283). Apparently, more than 2366 tropical years earlier, the Olmec priest-astronomers had been able to predict that this winter solstice would occur at the end of the first measured Long Count.[214] From the proposed inauguration date of the Long Count, 2368 (365-day) years plus 40 days—an even 2401-tun period—would pass before the count of days reached the winter solstice in 2012 CE. Furthermore, from the first winter solstice apparently given a name in the Long Count (6.19.19.9.15) or 20 December 355 BCE 1 Eagle [10 J Pre-Cuicuilco calendar = 14 P Cuicuilco calendar = 14 P Olmec calendar = 13 P Izapa calendar = 13 P Kaminaljuyu calendar = 13 P Tikal calendar] (1592118) to the winter solstice in 2012 CE, a total of 864165 days would elapse. This interval implies that the length of a mean tropical year is about 365.243026 days, about 1.2 minutes longer than the modern estimate. In that period, 6 b'aktun, 8 winal, and 5 k'in also would pass.

A calculated beginning date of the first measured Long Count also was determined. On 11 August 3114 BCE 4 Lord [0 G Pre-Cuicuilco calendar = 4 M Cuicuilco calendar = 4 M Olmec calendar = 3 M Izapa calendar = 3 M Kaminaljuyu calendar = 8 M or K'umk'u Tikal calendar]

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[212] Ibid., 118, 195.

[213] Ibid., 21, 100-01, 118-19. In Edmonson's calendrical genealogy, the first Olmec Calendar Round appears to have begun with the Cuicuilco calendar year that ended on 23 August 667 BCE 1 Lord [19 F Cuicuilco calendar] 6.4.2.12.0 (1478043).

[214] Ibid., 119-20.

0.0.0.0.0 (584283), the Long Count began—at least from an invented standpoint—its measurement of the b'aktun period.[215] The mythical value of this day to ancient Mesoamericans appears to be lost to history, but the modern value of the date 4 Lord 0 G (Pre-Cuicuilco calendar) or 4 Ajaw 8 K'umk'u (Tikal calendar) is the Julian day number with which it has been linked. That is, the native calendars of Mesoamerica customarily have been correlated with proleptic European calendars through the proposals of various Julian day numbers for this date.

3.11.2 The correlation constant

The Julian day number for the date 11 August 3114 BCE 4 Ajaw 8 K'umk'u 0.0.0.0.0 is sometimes called its "correlation constant". Edmonson catalogued 45 separate correlation constants that had been proposed in the 20th century CE, ranging from 394483 to 744083 (from about 3634 to 2676 BCE). He concluded that "[t]he ethnohistorical data collected in [his study] support the Thompson 1950 correlation constant of 584,283"; indeed, "the correlation constant of 584,283 is the only acceptable solution to the 'correlation question'".[216]

In 2013, an examination of Beam e, Lintel 3 (Temple I) from Tikal was reported to have used high-resolution AMS radiocarbon dating and calibration from tree growth rates. The analysis concluded that the dates derived from the examination overlapped (at the 95% confidence level) and provided "strong evidence" for the "Goodman-Martínez-Thompson" or "GMT" group of correlation constants.[217] The GMT group of correlation constants range through a period of seven days from 584280 through 584286.[218] The central constant of this group (584283) is the one used in Edmonson's calendrical genealogy and in most of the specific dates presented in this study. Any deviation in this study from this correlation constant will be noted and the reason(s) for the deviation will be explained. With these details of early Mesoamerican calendars and astronomy introduced, this study may now return to the issue of number-term symbolism in the writings of $Jacob_2$'s descendants.

3.12 The stated cardinal letter-set created by Enos

This study proposes that the entire stated cardinal or (L) letter-set initiated by Enos was planned from its inception. Enos appears to have prescribed the number-terms he wanted his descendants to record. The textual evidence that supports this proposal includes the following.

Uniformity of year-terms and narrative-links. Beginning with $Nephi_1$'s final temporal-expression, every year-term in the remainder of the small plates of Nephi is an express plural or B year-term. Twelve of such year-terms follow $Nephi_1$'s writings. This uniform feature creates a foundation for each of the other kinds of textual evidence. All 12 narrative-links that follow $Nephi_1$'s writings are verbal or R narrative-links. However, $Jacob_2$'s narrative-links, in order, are

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[215] Ibid., 119, 214-20. Edmonson gives the year for this date as "3113" BCE; however, this is an error. See, e.g., Coe, *Breaking the Maya Code*, 62; Schele and Freidel, *A Forest of Kings*, 82. In some computer-generated proleptic calendars, this year may be described as "-3113" because a "0" year in such calculations represents 1 BCE. The same "3113" error occurs in Aveni, *Empires of Time*, 211.

[216] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, *x*, 165-67.

[217] Douglas J. Kennett, Irka Hajdas, Brendan J. Culleton, Soumaya Belmecheri, Simon Martin, Hector Neff, Jaime Awe, Heather v. Graham, Katherine H. Freeman, Lee Newsom, David L. Lentz, Flavio S. Anselmetti, Mark Robinson, Norbert Marwan, John Southon, David A. Hodell, and Gerald H. Haug, "Correlating the Ancient Maya and Modern European Calendars with High-Precision AMS ^{14}C Dating," *Scientific Reports* 3 (2013) 1597:1-5, accessed at nature.com/articles/srep01597.

[218] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 165-67.

had passed, *had*, *had passed*, and *shall come*, and the first narrative-link of Enos is *pass*. Beginning with the second narrative-link of Enos [the one associated with his creation of the (L) letter-set], the remaining narrative-links placed in the small plates by Enos and his descendants all are the verb *had passed*. This uniformity may indicate that Enos commanded his descendants not only to use express plural year-terms and verbal narrative-links, but to use only the verb *had passed* for their narrative-links.

Personalized long name time-term. $Jacob_2$'s first time-term has been identified as a long name or D time-term, a specific phrase that appears first in his writings but also in temporal-expressions of the plates of Mormon when $Mosiah_2$ was enthroned and when $Lehi_1$'s 600-year interval reached an end. In each instance, the phrase *from the time that Lehi left Jerusalem* is associated with an officially recognized event. In the second temporal-expression of Enos, this official phrase occurs in the time-term, but it has been personalized by Enos adding a crucial phrase *our father*: "from the time that *our father* Lehi left Jerusalem" (italics added). The time-term has been personalized, so as to be part of the second (G) letter-set in the developing (GHGHG) time-term letter-group in the writings of $Jacob_2$ and his descendants. The phrase *our father* clearly refers to the literal father of $Nephi_1$ and $Jacob_2$, but as to Enos, $Lehi_1$ was a grandfather, i.e., "[a] male ancestor more remote than a parent, *esp*[*ecially*] the founder of a … family".[219]

Omitted time-terms. The temporal-expressions recorded by Jarom, Omni, and Amaron are uniform in a way that contrasts with the second time-term of Enos. His time-term was both official (long name) and genealogical (our father). Their temporal-expressions have no time-terms at all. Thus, the Lehi era context of their temporal-expressions apparently is to be inferred from the second time-term of Enos. He is the writer who identified their chronological system (official Lehi calendar and 7-day week) and their parentage, at least to his own time. Every temporal-expression that appears in "his" (L) letter-set apparently is to be understood as uniform in its measurement of the Lehi era context.

Commandments of our fathers. An (L) letter-set designed by Enos still had to be later realized when his son Jarom complied with "the commandments of [his] fathers", and when Jarom's son Omni conformed to "the commandments of [his] fathers". Omni's son Amaron, who recorded the last of the L number-terms in this letter-set, does not mention the commandments of his fathers, but his brother Chemish noted that he "saw the last which [Amaron] wrote" and "after this manner we keep the record, for it is according to the commandments of our fathers".[220] This emphasis on commandments surely involves the commands passed along from $Nephi_1$ to $Jacob_2$, and then to $Jacob_2$'s descendants, but it does not preclude $Jacob_2$ commanding Enos with regard to his first temporal-expression, nor does it preclude Enos from commanding Jarom with respect to the following five temporal-expressions that would provide L number-terms and fill the (L) letter-set created by Enos.

The genealogical emphasis. If Enos planned the number-terms of his (L) letter-set, he could not have known which of his descendants would be able to report that 200, 238, 276, 282, or 320 Lehi calendar years had passed away. Hence, to continue to maintain the credibility of the temporal record, an accurate genealogical record of the guardians of the small plates of Nephi

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[219] *The Compact Edition of the Oxford English Dictionary*, I: 968-69 (father).

[220] Jarom 1:15; Omni 1:3-5, 8-9.

was crucial. Whenever 200 Lehi calendar years had passed, the then-current guardian must record it. Whenever 238 of such years had passed, the then-current guardian must record it, and so forth. The names and relationships of the men who maintained the chain of possession of the plates were vital to the authenticity of their temporal record.

In this regard, the writings of Enos are remarkably empty of genealogical notes. He mentions "my father" twice and those details contrast with his expectation that the Redeemer would also refer to "my Father".[221] The writings of Enos do not mention how he obtained the plates or from whom, perhaps because the book of his father $Jacob_2$ provided those details. Nonetheless, Enos also does not name the guardian to whom he delivered the plates. His choice not to mention genealogical details is striking. Indeed, that choice highlights and contrasts with his descendants' later emphasis on genealogy. Jarom provided explicit details: "Now behold, I Jarom write a few words according to the commandment of my father Enos, that our genealogy may be kept." Even though Jarom later noted that he was delivering "these plates into the hands of [his] son Omni," the new guardian Omni expressly noted, at the beginning of his writings, that he was "commanded by [his] father Jarom" that he "should write somewhat upon these plates to preserve our genealogy". Omni and Amaron both later noted their father-son relationship. Amaron and Chemish noted their sibling relationship. Abinadom noted that he was "the son of Chemish" and Amaleki likewise noted that he was "the son of Abinadom".[222] As succeeding guardians of the plates, Chemish, Abinadom, and Amaleki mentioned their respective positions among the descendants of Enos, but they did not record temporal-expressions. They may have been commanded not to do so. Earlier guardians appear to have recorded the five temporal-expressions for the (L) letter-set that Enos created and may have fully designed.

Once the required temporal-expressions with stated cardinal or L number-terms and omitted or H time-terms were included in the record, only the genealogy of the guardians was required, apparently until the time came for the last reported guardian chosen from $Jacob_2$'s descendants to record the fulfillment of $Lehi_1$'s prophecy. The time for that last temporal-expression arrived, but the line of $Jacob_2$'s descendants who could be guardians of the small plates had ended long before. Amaleki, the last of the descendants to write in the small plates, noted that he had "no seed", that he had a brother who had "gone into the wilderness to return to the land of Nephi", and that he was "about to lay down in [his] grave"; so, he transferred the plates into the guardianship of the Nephite king Benjamin. Not until the time of $Mormon_2$, several centuries later, was any final temporal-expression added to the small plates of Nephi.[223]

The 38-year and 44-year intervals. The recording of temporal-expressions by Jarom, Omni, and Amaron suggests three repeated 38-year intervals (the latter two of which are separated by a six-year interval) and two 44-year intervals that occurred over a period of 120 years. Nothing about these periods suggests that they represent personal intervals derived from individual life experiences. While Omni's 38-year interval might be interpreted several ways in relation to his report about his life choices and profession, the related Set-contexts suggest close attention to calendrical and astronomical matters. His choices and profession do not explain his father Jarom's 38-year interval or that of his son Amaron. Nonetheless, if Enos planned that the

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[221] Enos 1:1, 3, 27.

[222] Jacob 7:27; Jarom 1:1, 15; Omni 1:1, 3-4, 8-10, 12.

[223] Omni 1:23-30; Words of Mormon 1:1-8.

number-terms of his (L) letter-set would include a series of 200, 238, 276, 282, and 320 Lehi calendar years passing away, what were his reasons for doing so? He was familiar with $Nephi_1$'s and $Jacob_2$'s Sets, Set-sums, and Set-contexts and, at least as to his own book, he seems to have followed their examples. He also personalized the long name time-term included by his father, apparently to create time-term uniformity for his descendants. Does the number-term series 200, 238, 276, 282, and 320 personalize his number-term symbolism somehow?

All the foregoing textual matters at least raise a question and in fact may imply that the number-terms in the (L) letter-set of Enos symbolize not just the Set-contexts suggested above, but some additional and personal chronological matter that Enos could have planned decades in advance. This chronological matter is now analyzed in connection with the calendrical genealogy that has been introduced briefly above and depicted in Figure 3.3.

3.12.1 Comparative chronology

To compare the timing of the temporal-expressions of Enos, Jarom, Omni, and Amaron with Edmonson's proposed calendrical genealogy, the years associated with the lives of $Jacob_2$ and his descendants must be identified and examined. The identification begins before the birth of $Jacob_2$, with the first year of Zedekiah, king of Judah,[224] the only year specified in the small plates of Nephi that has been identified in proleptic European calendars with enough certainty that it may be compared with Edmonson's proposed Mesoamerican dates. $Lehi_1$ was called to be a prophet in the first regnal year of Zedekiah, which appears to have begun in 597 BCE.[225] According to $Nephi_1$'s record, $Lehi_1$ and his family departed from Jerusalem about the time that the Jewish prophet $Jeremiah_1$ was "cast into prison". Then Jerusalem was destroyed "immediately after [$Lehi_1$] left Jerusalem".[226] According to later Hebrew Scriptures, $Jeremiah_1$ was imprisoned in a life-threatening way during the tenth regnal year of Zedekiah and the destruction of the city occurred in the 11th regnal year of Zedekiah, during the summer of 587 or 586 BCE (depending on how his 11 regnal years may have been counted). Hence, it seems reasonable to place the departure of $Lehi_1$ and his family from Jerusalem in 589-87 BCE, before the Babylonian siege of the city occurred or during the few months when the siege was lifted and many others also left Jerusalem. ($Jeremiah_1$ was "cast into prison" when he tried to leave.)[227]

Table 3.H provides a comparative chronology of the years related to Edmonson's calendrical genealogy and the years possibly associated with the lives of $Jacob_2$ and his descendants. In this table, Lehi calendar years mentioned in the text of the small plates (each proposed to be a 12-month lunar year) have been converted into the equivalent tropical years, so that they are compatible with a proleptic Gregorian calendar. Within eight Lehi calendar years after the departure of $Lehi_1$ and his family from Jerusalem (about 7.8 Gregorian years), $Jacob_2$ and his younger brother $Joseph_2$ were born.[228] When 55 Lehi calendar years (about 53.4 Gregorian years) had passed from the time $Lehi_1$ left Jerusalem, $Nephi_1$ entrusted the small plates to the

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[224] 1 Nephi 1:4.

[225] See Division 5, Lehi's Departure from Jerusalem.

[226] 1 Nephi 7:14; 2 Nephi 25:10.

[227] See Division 5, Lehi's Departure from Jerusalem.

[228] 1 Nephi 17:4; 18:7.

guardianship of $Jacob_2$.[229] This would have been about 536-34 BCE. $Jacob_2$ apparently lived to see the end of the 97th Lehi calendar year, which seems to have occurred about the time he delivered the plates to his son Enos;[230] so, that event may have occurred some 94.1 Gregorian years after the family of $Lehi_1$ left Jerusalem (about 495-93 BCE). Enos delivered the plates to Jarom when 179 Lehi era years had expired;[231] so, about 173.7 Gregorian years had passed (about 415-13 BCE). Jarom's final temporal-expression recorded that 238 Lehi era years had ended;[232] so, he finished writing about 230.9 Gregorian years after $Lehi_1$ left Jerusalem (about 358-56 BCE). Omni's second temporal-expression recorded 282 Lehi era years having ended;[233] so, he finished writing about 273.6 Gregorian years after his ancestor left Jerusalem (about 315-13 BCE). The last of the stated cardinal or L number-terms appears in Amaron's temporal-expression, which recorded that 320 Lehi era years had expired. This interval is about 310.5 Gregorian years; so, the time was approximately 278-76 BCE. All these chronological details are summarized in Table 3.H.

3.12.2 Terminally named Mesoamerican calendars

Sections 3.2.20, 3.3.15, and 3.4.23 above presented $Nephi_1$'s symbolic calendrical contrasts of the Egyptian and Mesoamerican 365-day calendars. He was apparently aware of terminally named calendars, which counted the 5-day epagomenal period ahead of the 360-day block of time. He also seems to have understood that the 365-day year could be divided into 105-day and 260-day intervals, with the 105-day portion first (in the terminally named calendars). According to Edmonson's calendrical genealogy, the terminally named calendars commenced their measures of time with the Cuicuilco calendar in 739 BCE and continued with the Olmec calendar in 656 BCE. Hence, when $Lehi_1$ and his followers arrived in the New World (perhaps 575-70 BCE), terminally named, 365-day calendar years had been counted in Mesoamerica for more than 150 years. The 260-day calendar also gave the 365-day calendar the names of its year bearers, but the sacred names themselves appear to have been ancient by the sixth century BCE.

Thus, during the lifetime of $Jacob_2$, the creation of a third terminally named calendar that proved the accuracy of a 219-year Cuicuilco solar era may have been communicated through many of the communities that existed in Mesoamerica. $Jacob_2$ does not mention this in his book, most likely because his attention was drawn to the attack of Sherem and its miraculous conclusion, vivid events that occurred some 25 or more years after the apparent creation of the provisionally named Izapa calendar in 520 BCE. Furthermore, if the people of Nephi understood and used the earlier Cuicuilco or Olmec calendar, the creation of the Izapa calendar may not have affected them or their temporal relationships with their neighbors. The priest-astronomers, however, likely were made aware of the Izapa confirmation of the 219-year solar interval.

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[229] Jacob 1:1-8.

[230] See Jacob 7:27 and Sections 3.5.3, 3.5.5-3.5.9, and 3.6.1 of this Part 3.

[231] Enos 1:25.

[232] Jarom 1:13.

[233] Omni 1:5.

3.12.3 Initially named Mesoamerican calendars

During the lifetime of Enos, a calendrical renewal and innovation seems to have occurred that may have had an immense effect on the temporal relationships of the Nephite kings (or chieftains) and their neighbors: the inauguration of the provisionally named Kaminaljuyu calendar. The Cuicuilco calendar and its terminally named calendrical progeny continued to measure the summer era, but with the Kaminaljuyu calendar, the initial naming of the Pre-Cuicuilco calendar was renewed. However, instead of the ancient calendar's apparent observation and measurement of a fall equinox era, the Kaminaljuyu calendar instituted a spring equinox era. Another 219-year summer era measurement seems to have occurred from the creation of the Olmec calendar, but about four more years were allowed to pass before the spring era calendar was formalized. Similarly, another 83-year summer era interval seems to have occurred from the creation of the Izapa calendar, but again, about four more years were allowed to pass in preparation for the inauguration of the spring era Kaminaljuyu calendar.

A crucial aspect of the spring era calendar seems to have been focused on a forecast of a future spring equinox when five days (not just 360 days in 20-day tranches) could be subtracted in the anti-leap-year approach to measuring the 1507-year solar era. To equate 1507 solar years with 1508 365-day calendar years, all 365 days of the extra calendar year needed to be subtracted. The plan may have been to "solve" the month X or five-day "problem" in the spring era by subtracting 105 days first and all at once, leaving 260 days to be subtracted or erased in 13 20-day tranches over the remaining approximately 1075 years. The calendars of Teotihuacan (165 BCE) and Tikal (84 CE) would later be derived as spring era calendars with origins in these Olmec and Kaminaljuyu calendar calculations. Of course, no actual days could ever be subtracted or erased. The "omission" of such days could never be "detected" by anyone other than the priest-astronomers. "[T]he new calendars are tied back into the eral calculation at the correct dates" and the subtracted days merely "vanish into the abyss between two different calendrical perspectives of the same reality like the interocular distance between two eyes focused on the same object".[234]

If Enos lived in a Mesoamerican context and was a priest-astronomer to a kingdom (or chiefdom) in the Mesoamerican pattern, as well as being a prophet among the "exceeding many prophets" of the Nephite people,[235] then he may have wanted to describe the great calendrical change that occurred relatively late in his long life. From the time he received the small plates from his father $Jacob_2$ (about 495-93 BCE) to the time he delivered the plates to his son Jarom (about 415-13 BCE), about 80 solar years passed away. Assuming Enos was 12-15 years of age at the time he received the plates, Enos lived to 92-95 years of age. At the time of the spring era calendar inauguration (433 BCE), Enos would have been in his late 70s. He was tasked with maintaining the credibility of his count of Lehi calendar years. How could he make it clear that he and his descendants were aware of, and capable of considering, the solar calendar innovation and renewal of their time? How could he assure that his descendants continued to measure and count the ancient Lehi calendar? How could he assure later Nephite and Lamanite[236] readers that

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[234] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 121-22.

[235] Enos 1:19, 22.

[236] Enos 1:20, 24.

he and his descendants knew of, understood, and could measure lunar calendar years in strict accord and compatibility with the spring equinox era?

3.12.4 The pre-determined number-terms of Enos

Enos not only personalized the long name of the Lehi era, but he did so by emphasizing his genealogy in two distinct ways. He personalized an official time-term to unify the (L) letter-set he created. In his second temporal-expression, he reiterated the fact that $Nephi_1$, his father $Jacob_2$, he himself, and his descendants were recording official Lehi calendar years "from the time that *our father* Lehi left Jerusalem".[237] No previous writer had used the phrase *our father* in a Lehi era time-term. This temporal-expression of Enos began the last stated cardinal or (L) letter-set in the small plates of Nephi. His descendants who recorded temporal-expressions did so in strict accord with the pattern that $Nephi_1$, his father $Jacob_2$, and he himself appear to have required of them: a verbal or R narrative-link (now always "had passed"), an express plural or B year-term (always "years"), and a stated cardinal or L number-term (perhaps specified by Enos to record 38-year and 44-year intervals from the 200th anniversary of $Lehi_1$'s departure from Jerusalem). The second way he emphasized his genealogy was to require his descendants who would record L number-terms to omit any time-term in their temporal-expressions and to express their genealogy consistently, so that it would be clear the years they measured began at "the time that *our father* Lehi left Jerusalem".

Did Enos also personalize the stated cardinal or L number-terms that followed his own? If he did, it would be clear evidence that his descendants' number-terms were planned by him. If he designed their number-terms, how does the text evidence that design and what may be learned from the number-terms he specified?

In accordance with the analytical assumptions of this number-term analysis, the five number-terms that follow the Book of Enos may be understood as expressing numbers of years and as symbolizing numbers of days. Like the number-terms of $Nephi_1$ and $Jacob_2$, the number-terms of Enos and his descendants were to be understood as symbolizing calendrical and/or astronomical intervals of time, as detailed in Sections 3.2-3.8 above. However, it would seem that Enos also personalized these symbols. He seems to have intended his (L) letter-set to provide evidence of key aspects of the local culture of astronomical observation and calendar keeping, including the most ancient part of that culture, the 260-day calendar. He seems to have undertaken a personalization even of the symbolism of number-terms.

The five stated cardinal or L number-terms in the writings of Jarom, Omni, and Amaron occur in the following temporal order: 200, 238, 276, 282, and 320. The four intervals between the stated numbers are 38, 38, 6, and 38. As numbers of days, 200 and 320 are evenly divisible by 20; so, the first and last limits of this placement pattern may suggest the ancient temporal count of 20 sacred names. At the center of the five-part placement pattern, the number 276 occurs. This number may have been crucial to the development of the 1507-year solar era, which, perhaps not surprisingly, also appears to have been a lunar era that measures synodic months. An interval of 1508 365-day years is exactly 550420 days. The interval of 1507 solar years is about 550419.977 days and the interval of 18639 mean synodic months is about

[237] Enos 1:25, italics added.

550420.63 days. Thus, a count of 1508 calendar years provides close accords with both the solar cycle and the synodic month cycle.

As noted in Section 3.8.5 above, a short solar interval also may be suggested by a period of 276 days. In the sixth century BCE, the time from winter solstice to fall equinox usually could be measured with 276, 277, or 278 days. In this observation, 276 is at the lower end of the commensurations. However, the time from spring equinox to winter solstice usually could be measured with 274 or 275 days. If it were ever observed to be 276 days, that number would be at the upper end of the series of possible days for measuring an annual spring to winter solar interval. Again, the number 276 seems to be at the center of a five-part series: 274, 275, 276, 277, and 278 seasonally related days.

As discussed in Section 3.10.4 above, the 7540-day numerological patterns of the 260-day calendar—in association with the measurement of 276 sidereal months—may have evidenced a calendrical and astronomical reality closely relating the positions of the moon in the heavens. These patterns seem to have suggested similar patterns could be found that would evidence a calendrical and astronomical reality related to the sun's positions in the heavens. This theory apparently proved to be accurate, whether applied to 219-year or 260-year blocks of time, but these shorter solar eras required the priest-astronomers to calculate with "leap periods" or "leap days". The theory also proved to be accurate when applied to the 1507-year solar era or the 18639-month lunar era (1553 12-month lunar years plus three synodic months). However, the interval was measured exactly with 1508 365-day years, without any need to include "leap periods" or "leap days" to conform with the calendrical measurement. Hence, in its most elemental temporal symbolism, the central number 276 in the five-part pattern recorded by the descendants of Enos appears to symbolize the full moon at its nighttime zenith in a pattern with first and last visible crescents at its limits, and the sun at its noon-day summer solstice zenith in a five-part pattern with sunrise and sunset at the spring and fall equinoxes at its limits. The five-part pattern apparently intended by Enos is as basic a temporal pattern as the *¤⏣¤* symbol pattern and AB[A]BA letter pattern discussed in Part 2 of this Division.[238]

Does the central number 276 recorded by Omni symbolize anything else? If one were to assume that the proposed personalization of number-terms by Enos also had reference to the number of days in the most personal of the indigenous calendars and the related measurement of time, what symbolic connections may have been intended? In other words, if the cardinal numbers 200, 238, 276, 282, and 320 may be deemed to represent ordinal numbers in a series of 260 sacred numbers, does any significant symbolism occur?

3.12.5 Analyzing the Jarom and Omni number-terms

The specific question examined with respect to the five L number-terms recorded by the descendants of Enos was whether they may have symbolized meaningful days related to each proposed Mesoamerican calendar's New Year or year bearer. This Section describes the analytical procedure designed to identify the sacred day names possibly implied by the L number-terms 200, 238, 276, 282, and 320. The following Section discusses the results of the analysis. The procedure was planned to bring together three kinds of data: the cardinal numbers

[238] See, e.g., Division 2, Part 2, Sections 2.2.3 and 2.2.4.

recorded in the number-terms of the books of Jarom and Omni; the days of the 260-day calendar depicted in Figure 3.1; and the calendrical genealogy proposed by Edmonson (as represented by the sacred names of the New Year and year bearer of each calendar innovation). The analysis assumed that New Year and year bearer names would be crucial records maintained by priest-astronomers. The names and their respective day identifiers (as set forth in Figure 3.1) may be summarized as follows.

Calendar	New Year	Year bearer
Cuicuilco	6 Sun (6.a and 201)	1 Lord (1.t and 40)
Olmec	4 Owl? (4.p and 56)	12 Eagle (12.o and 155)
Izapa	5 Quake (5.q and 57)	13 Owl? (13.p and 156)
Kaminaljuyu	7 Jaw (7.l and 72)	7 Jaw (7.l and 72)

The day of a calendar's New Year or year bearer was assumed to be either the first day of the L number-term's symbolic number of days or the day preceding the L number-term's symbolic number of days. For example, if a calendar's New Year or year bearer was assumed to be day 1 of the 200-day interval, then the count would end 199 days later on day 200 of that interval (1+199 = 200). However, if a calendar's New Year or year bearer was assumed to be the day preceding the 200-day interval, then the count would end 200 days later, again on day 200 of that interval (0+200 = 200). The final day that the L number-term represented was assumed to be the sacred day symbolized by the number-term. Two examples of this simple day name calculation are as follows.

Calendar	New Year	Day name calculation
Olmec	4 Owl? (56 = 1)	56+199 = 255 (8 Eagle or 8.o in Figure 3.1)
Calendar	Year bearer	Day name calculation
Cuicuilco	1 Lord (40 = 0)	40+200 = 240 (6 Lord or 6.t in Figure 3.1)

If the addition of an identifying number associated with a New Year or year bearer and the number of days symbolized by an L number-term reached a sum greater than 260, then 260 was subtracted, so that the sacred name of the potentially symbolic day could be identified in Figure 3.1. The following examples of day name calculations depict this more complex situation.

Calendar	New Year	Day name calculations
Cuicuilco	6 Sun (201 = 0)	201+238 = 439 and 439-260 = 179 (10 Rain or 10.s)
Calendar	Year bearer	Day name calculations
Izapa	13 Owl? (156 = 1)	156+319 = 475 and 475-260 = 215 (7 Eagle or 7.o)

In the complete or extended analysis, a total of 120 calculations combined all six number-terms of the (L) letter-set created by Enos with the four calendars identified above and the Pre-Cuicuilco calendar's "last" year (Figure 3.2), and with the two numerical understandings (0 or 1) of the possible position of each New Year and year bearer (2x2x5x6 = 120). In addition, 12 more day name calculations combined all six number-terms of the (L) letter-set with the beginning date of the 260-day calendar depicted in Figure 3.1 (1 Sun), and with the two numerical understandings (0 or 1) of the potential calendrical positions of 1 Sun.

3.12.6 The calendrical genealogy apparently symbolized by Enos

Seven of the 132 calculated day names seem to imply dates related to Edmonson's proposed calendrical genealogy. These day names suggest relationships among the four 365-day calendars

listed above. A planned, but not yet inaugurated, 360-day Long Count also may be suggested by one of the seven calculations. Four of the seven calculations relate to New Year days(each understood as day 1 of their associated L number-term day count) and three relate to year bearer days (each understood as terminally named or the day preceding its associated L number-term day count, i.e., day 0). The seven calculations may be depicted as follows.

Calendar	New Year	Day name calculations
Cuicuilco	6 Sun (201 = 1)	201+199 = 400 and 400-260 = 140 or 10 Lord (10.t)
	6 Sun (201 = 1)	201+319 = 520 and 520-260 = 260 or 13 Lord (13.t)
Olmec	4 Owl? (56 = 1)	56+275 = 331 and 331-260 = 71 or 6 Monkey (6.k)
Izapa	5 Quake (57 = 1)	57+275 = 332 and 332-260 = 72 or 7 Jaw (7.l)
Calendar	Year bearer	Day name calculations
Cuicuilco	1 Lord (40 = 0)	40+200 = 240 or 6 Lord (6.t)
	1 Lord (40 = 0)	40+320 = 360 and 360-260 = 100 or 9 Lord (9.t)
	1 Lord (40 = 0)	40+276 = 316 and 316-260 = 56 or 4 Owl? (4.p)

Symbolic New Years. When the Cuicuilco calendar New Year (6 Sun) is considered the first day of 200-day and 320-day counts, the concluding days symbolize 10 Lord and 13 Lord, respectively. The numbers 200 and 320 are the first and last of the L number-terms recorded by the posterity of Enos and, if interpreted as having been commanded by Enos, they represent the first and last of the L number-terms he wanted his posterity to remember and record. The inauguration of the first terminally named calendar appears to have been placed symbolically within a complete 260-day calendar count (ending on 13 Lord) and within a Calendar Round that matches a complete 260-day count with each day of the 365-day calendar year.

The New Years of the Olmec and Izapa calendars are a day apart in the 260-day calendar because of the one-day Izapa advance from the Cuicuilco calendar. When each New Year is considered the first day of a 276-day count, the concluding days of those calculations represent 6 Monkey and 7 Jaw, respectively. The number 276 is the third and central L number-term recorded by the posterity of Enos. It is the sun at noon-day in a simple five-part day symbolism and it is the full moon at zenith during the central night of a synodic month.

The day named 6 Monkey was the last of the Cuicuilco, Izapa, and Olmec era days for the priest-astronomers and their communities that inaugurated the Kaminaljuyu calendar. The inauguration was separated by some four additional years from the conclusion of a 219-year Olmec New Year period and from the conclusion of an 83-year Izapa New Year period. After 6 Monkey, the terminal naming of the Cuicuilco, Olmec, and Izapa calendars and the six-day advance of the Cuicuilco and Izapa 520-year solar eras were no longer necessary. The Kaminaljuyu calendar renewed the ancient Pre-Cuicuilco calendar count with its initially named year bearer identified with the New Year, and with its month X as the last month of the 365-day year. The Olmec 1507-year solar and synodic month eras measured a summer solstice era. The Kaminaljuyu calendar innovation applied the length and numerology of that era to the spring equinox. The day named 7 Jaw fell on the spring equinox of 433 BCE and became the New Year and initial name day of the Kaminaljuyu calendar. Type II year bearers (Jaw, Quake, Wind, and Deer) would initialize each year of the spring era measured by the Kaminaljuyu calendar.

In a world where terminally named 365-day calendars once had been prevalent,[239] Omni obeyed his father's commands and recorded a 276-year interval apparently symbolizing the inauguration of the Kaminaljuyu calendar during his grandfather's lifetime. Six years later, Omni recorded a 282-year interval that symbolized a day six days further on. This day could have implied the Cuicuilco calendar's six-day advance. With the Kaminaljuyu calendar in place, however, the Cuicuilco 520-year solar era could be withdrawn from active measurement and retired to the pages of history. With the six-year period treated the same way, the L number-terms 238 and 282 also may help to imply that the three 38-year periods discussed in Section 3.8.4 above would be consecutive and that the 38-year lunar intervals may have been perceived, at least at the time, as a long-term warning system of approaching eclipses.

Symbolic year bearers. When the terminally named Cuicuilco calendar year bearer (1 Lord) is considered to be day 0 or the day preceding the 200-day and 320-day counts, the concluding days are 6 Lord and 9 Lord, respectively. In addition, when 1 Lord is considered to be the day preceding the central 276-day count, the concluding day is 4 Owl?. On this day, the inauguration of the Olmec calendar apparently occurred, and the priest-astronomers first began to record their understanding of the 1507-year solar and synodic month eras. In this view of the Cuicuilco year bearer, the inauguration of the Olmec calendar seems to be symbolized within the temporal context of Type V named Cuicuilco years. Even further, the calculation 40+320 = 360 may suggest a constant Olmec 360-day calendar and the contemplation of a future inauguration of the Long Count on the numerological and calendrical date identified by Edmonson.

All this proposed calendrical symbolism, when viewed with the textual considerations listed in the introduction of Section 3.12, suggests that the L number-terms recorded by the posterity of Enos had nothing to do with their personal histories, other than that they were alive and recorded the number-terms created and commanded by Enos. A terminally named calendar heritage seems to have governed their daily civil calendar keeping until relatively late in the lifetime of Enos. While their religious calendar involved 7-day weeks and 12-month years, the existence of a 1507-year solar and synodic month era provided a mathematical system for ensuring that their measurement and recording of synodic months and Lehi calendar years were true. In summary, this study proposes that:

1. the sacred day symbolism was as personal to, and intended by, Enos as was his insertion of "our father" in the long name of the Lehi era;
2. Enos composed every L number-term that appears in his (L) letter-set;
3. the descendants of Enos were commanded to faithfully record his number-terms when those numbers of years were realized;
4. they were also commanded to record their genealogy as an assurance that the Lehi year count had been faithfully maintained;
5. the number-terms of Enos were precise as to their symbolic use of the 260-day calendar; and
6. the symbolism of the number-terms was exacting as to its communication of the terminally named calendar origins and inauguration date of the innovative, spring era, initially named Kaminaljuyu calendar.

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[239] See, e.g., Sections 3.3.7, 3.3.10, 3.3.15 and 3.4.12 of this Part 3.

To be clear, based on the evidence in the small plates of Nephi, this study does not propose that the people of Nephi originated the Kaminaljuyu calendar. Enos appears to have been familiar with its origin and purpose; so, the people of Nephi may have been a community that adopted, or perhaps just monitored the progress of, this calendar.

3.13 The Words of Mormon number-term

The analysis of number-terms sorted within the seven major divisions of the small plates of Nephi concludes with the Words of Mormon. This analysis may be undertaken now that the calendrical genealogy apparently symbolized in the books of Enos, Jarom, and Omni has been examined. This was an ancient genealogy by the time of $Mormon_2$. The text known as the Words of Mormon contains one number-term, a single proposed Set, a definite Set-sum, and a seemingly mundane, but chronologically complex repetition of the diction of $Jacob_2$'s second and fourth number-terms.[240] The diction of $Mormon_2$'s single number-term, its language type, and its position in the text are as follows:

1. "many hundred", the last referenced cardinal or N number-term in the small plates, which creates the (N) number-term letter-set that concludes the (NLN) number-term letter-group begun by $Jacob_2$ in his final composition of the Book of Jacob.

In each instance where the number-term "many hundred" appears in the small plates, it has been categorized as a referenced cardinal or N number-term. In $Mormon_2$'s temporal-expression, the chronological structure of the small plates is completed by the 12th verbal or R narrative-link ("is") and 12th express plural or B year-term ("years") that follow the conclusion of $Nephi_1$'s writings. These elements of temporal-expressions are attended by $Mormon_2$'s final personalized or G time-term, which completes the five-part, alternating, balanced and reversible (GH[G]HG) letter-group, and his equally finishing N number-term, which concludes the three-part, alternating, balanced and reversible (NLN) letter-group. Thus, as Table 2.A of this Division indicates, the temporal-expression in the Words of Mormon may be described in terms of language types as an RBGN expression and as the last of four such expressions in the small plates of Nephi.

"[M]any hundred" years after the times of $Lehi_1$ and $Nephi_1$, $Mormon_2$ finished the chronological structure and placement symbolism of the small plates, while testifying that $Nephi_1$'s fourth generation prophecy of Nephite destruction[241] was about to be fulfilled and that $Lehi_1$'s 600-year Messianic prophecy[242] had been fulfilled. $Mormon_2$'s life and people were about to be destroyed by vast armies of the Nephites' enemies. In this narrative context, he solemnly declared, "I Mormon … have witnessed almost all the destruction of my people the Nephites. And it is many hundred years after the coming of Christ".[243]

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[240] Jacob 4:4; 7:7; Words of Mormon 1:2.

[241] 1 Nephi 12:11-23; 2 Nephi 26:7-11; compare Alma 45:12 and Helaman13:10.

[242] 1 Nephi 10:2-4.

[243] Words of Mormon 1:1-2.

3.13.1 The 300-year interval

The same diction of the referenced cardinal or N number-term in $Mormon_2$'s witness ("many hundred") appears twice in $Jacob_2$'s writings.[244] $Mormon_2$'s choice of "many hundred" to finish the small plates, near the end of the Nephite people, connected his witness of Christ to that of $Jacob_2$, who was present at the beginning of the Nephite people.[245] $Mormon_2$ honored the obedience of $Jacob_2$ and his descendants to $Nephi_1$'s "commands" regarding the purpose and composition of the small plates.[246] The diction of the three "many hundred" number-terms may seem indefinite, but the meanings are chronologically precise. In this context, the adjective *many* appears to mean "more than one", rather than "a great number".[247]

The referenced cardinal number in the Words of Mormon is easy to compute from his writings in the plates of Mormon. A similar approach to textual sourcing occurs with every referenced cardinal and referenced ordinal number-term in the small plates of Nephi. The implied definite number may be found in, or computed from, statements in the small plates or in another textual source held by the Nephites. $Mormon_2$ was born after 300 years in the NC era context had passed away.[248] He and his people faced their last great battle with the Lamanites before 400 years in the NC era context had occurred.[249] Thus, *many*, as used in the number-term of the Words of Mormon, implies the cardinal number name "three". When combined with the cardinal number name "hundred", the diction of $Mormon_2$'s year-related expression in the small plates implies an interval of 300 NC calendar years.

One might assume that $Mormon_2$'s 300-year interval was measured with a calendar year that was the same length as the Lehi calendar year, which appears most likely to have been a 12-month lunar calendar. Based on the mean length of a synodic month, 300 12-month years or 3600 synodic months would be about 106310.124 days. The interval of 3600 months also may be sorted as 200 18-month years. This interval of days suggests a near accord with the length of 3891 mean sidereal months (about 106308.579 days). The difference in the two mean astronomical intervals is about 1.5 days. As thus interpreted, $Mormon_2$'s 300-year interval appears to fit with the diction and accords mentioned elsewhere in the small plates of Nephi.

The principal difficulty with describing the 300-year interval in this manner is that it assumes the Lehi calendar year and NC calendar year were the same length. However, no textual evidence as to the composition of the NC era chronological system or the length of the NC calendar year is expressly provided in the small plates of Nephi. An implication of the use of a solar calendar of some sort in association with the lifetime of the Messiah perhaps could be drawn from $Lehi_1$'s vision, in which he beheld the Messiah "descending out of the midst of heaven, and … his luster was above that of the sun at noonday".[250] In Division 3 of this source book, the many texts in the plates of Mormon that evidence a 365-day NC calendar are examined.

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[244] Jacob 4:4; 7:7.

[245] 2 Nephi 6-10; Jacob 1:2-6; 4:1-5.

[246] Jacob 1:2-4, 8; 7:27; Jarom 1:1-2, 14-15; Omni 1:1, 3, 9.

[247] See Division 1, Part 4, Section 4.2.2.

[248] 4 Nephi 1:48-49; Mormon 1:1-5.

[249] Mormon 6:1-15; 8:1-6.

[250] 1 Nephi 1:9.

Nephi$_1$ indicated his familiarity with Egyptian and Mesoamerican 365-day calendars when he composed the Sets, Set-sums, and Set-contexts in his writings.[251] The symbolism relating to 365-day calendars that may be implied by the number-terms of Enos and his posterity indicates that Nephites were fully aware of, and using, 365-day calendars hundreds of years before the birth of the Messiah. Enos appears to have been schooled in the calendrical genealogy of the Mesoamerican 365-day calendars and to have understood their solar and synodic month eras.[252] Thus, it seems unlikely that the Nephite people, despite using the Lehi calendar for their religious purposes, would have lost or abandoned their own familiarity with a 365-day civil calendar. And when Lehi$_1$'s prophecy of the Messiah was fulfilled, they may have adopted the solar calendar for their religious purposes as well.

For comparison with the foregoing assumptive data based on the proposed Lehi calendar, it is sufficient at this point in the analysis to list similar chronological data associated with Mormon$_2$'s 300-year interval based on the assumption that the NC calendar year was composed of 365 natural days. Three hundred 365-day calendar years is 109500 days. This interval represents a close accord with the length of 3708 mean synodic months (about 109499.428 days) and a near accord with the length of 4024 mean draconic months (about 109501.973 days). The interval of 3708 synodic months may be sorted as 309 12-month years or as 206 18-month years. As thus interpreted, Mormon$_2$'s 300-year interval fits with the diction and implied commensurations of other writers in the small plates of Nephi.

3.13.2 The Set with Set-contexts of 300 days

Set definition. Mormon$_2$'s temporal-expression appears to provide a single number Set and identical Set-sum for his major division, the number 300. No other illustration of this Set and Set-sum is necessary.

Set-contexts. The Set-sum 300 suggests potential Set-contexts consisting of close accords with the lengths of 10 Egyptian conceptual lunar months (30 days each), 15 Mesoamerican day name cycles (20 days each), 11 mean draconic months (about 299.334 days), and 11 mean sidereal months (about 300.538 days).

3.13.3 Symbolism of Mormon$_2$'s number-term

When Mormon$_2$ chose "many hundred" as his number-term, a time of battle was nearing that appears to have been planned four years in advance;[253] so, Mormon$_2$'s choice of a number-term meaning 300 also may have permitted him to imply something about an eclipse season related to draconic months. As noted, 11 mean draconic months are about 299.334 days, an interval suggesting a close accord with a period of 300 natural days. Furthermore, an interval of four 365-day years is 1460 days, just a few days more than 53.5 mean draconic months (about 1455.854 days). Additionally, four eclipse years average about 1386.48 days. Thus, if the four-year period commenced during an eclipse season, the eighth following eclipse season would be ending about two synodic months before four 365-day years were ending. Perhaps, the four years

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[251] See Sections 3.3.7, 3.3.10, 3.3.13, 3.3.15, 3.4.12, and 3.4.23 of this Part 3.

[252] See Sections 3.9-3.12 of this Part 3.

[253] Mormon 5:6-9; 6:1-8; compare Ether 15:11-15.

allocated to planning the last great battle between the Nephites and their enemies had something to do with the timing and prediction of eclipse seasons.

In addition, $Mormon_2$ may have followed the lead of some other writers in the small plates (including $Nephi_1$ and $Jacob_2$), whose proposed Set-sums also appear to be related to periods of sidereal months.[254] The number-term "many hundred" (meaning 300), as a Set-sum, suggests a Set-context of 11 mean sidereal months (about 300.538 days). This interval also presents a close accord with a 300-day calendar count and a near commensuration with an interval of 11 draconic months. Indeed, a 300-day interval suggests this as a time when 11 sidereal months are typically one day longer than 11 draconic months (the mean difference is about 1.2 days). One implication of a sidereal month Set-context may be that by the time of $Mormon_2$, Nephite priest-astronomers had observed, measured, and recorded sidereal months for hundreds of years as part of their chronological duties. Another implication may be that $Mormon_2$ relied on priestly astronomical and calendrical records to compose not only the temporal-expression he chose for completing the chronological structure, symbolism, and Messianic witness of the small plates of Nephi, but also the temporal-expressions he created for the plates of Mormon. This implication will be examined in Division 3 of this source book.

Lastly, $Mormon_2$ employed some sort of "Egyptian" language or, by his time, "reformed Egyptian" language to compose and engrave his writings on the small plates. All the writers before him in the small plates of Nephi apparently used similar language and characters "that none other people knoweth".[255] Having studied their writings, $Mormon_2$ would have been aware that $Nephi_1$'s number-term symbolism in First and Second Nephi distinguished an apparently terminally named Mesoamerican 365-day calendar from the Egyptian 365-day calendar known to $Lehi_1$ and $Nephi_1$.[256] Hence, $Mormon_2$'s reference to the number 300 may imply his understanding of, and intent to follow, $Nephi_1$'s example by symbolically contrasting Egyptian conceptual months of 30 days each and their base-10 number grouping system[257] with Mesoamerican conceptual months of 20 days each and their base-20 number grouping system[258] (30x10 = 20x15 = 300). In other words, $Mormon_2$'s choice of the number-term "many hundred" also may symbolize the Nephite record keepers' faithful maintenance of a written form of the Egyptian language and the record keeping practices of their ancient predecessors, $Lehi_1$ and $Nephi_1$, for more than 960 365-day calendar years.

3.14 Combined writers' number-terms

This Part 3 has identified proposed Sets, Set-sums, and Set-contexts within the major divisions of the small plates of Nephi. The potential symbolism of such Set-contexts has been examined for its implications regarding Nephite chronological culture. The basic symbolism of the proposed Sets appears to be the reliability of the reported measurement of the passing years in the Lehi era context. As part of this examination, three seemingly anomalous circumstances

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[254] See, e.g., Sections 3.2.18-3.2.19, 3.3.14, 3.4.22-3.4.23, 3.5.11, 3.7.6, 3.8.4, and 3.8.10 of this Part 3.

[255] 1 Nephi 1:1-2; Mosiah 1:1-8; Mormon 9:32-34.

[256] See Sections 3.2.20, 3.3.15, and 3.4.23 of this Part 3.

[257] E.g., Parker, *The Calendars of Ancient Egypt*, 7, 51-53; "Mathematics in Ancient Egypt", accessed at britannica.com/science/mathematics/Mathematics-in-ancient-Egypt; and "Egyptian Mathematics", accessed at math.tamu.edu/~dallen/masters/egypt_babylon/egypt.pdf.

[258] E.g., Aveni, *Empires of Time*, 190-212; Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 5-8, 111-25, 169-71, 196; Schele and Freidel, *A Forest of Kings*, 77-84.

involving the major divisions have been analyzed. With the major divisions attributed to a single writer ($Nephi_1$), additional Sets seemed to have been intended when the boundary between his two major divisions was disregarded. With the number-terms of two writers (Omni and Amaron) within a single major division, additional Sets seemed to have been intended when the different generations were disregarded. Furthermore, the proposed Set combining the two chronologically consecutive number-terms of Omni and Amaron seemed to follow the pattern of Enos, Jarom, and Omni within their respective major divisions. The third anomalous situation involved the writings of Enos and his descendants who recorded number-terms in the small plates of Nephi. Their (L) letter-set suggested the combination of the same type of number-term on a sequential basis as the letter-set was extended within the various major divisions. Thus, these anomalous situations suggested that Sets composed of number-terms recorded by different writers on a chronologically consecutive basis (without regard to major division boundaries) might have been intended. This possibility may now be analyzed.

The primary issue in defining multi-generational or combined writers' Sets is the same as for the major divisions, i.e., whether there exists a clear textual basis for the combination. With most of the Sets and symbolism proposed above, major division boundaries are certain, and their proposed Sets and symbolism are consequently delimited by the temporal-expression diction, language types, placements, and associated narratives within the major division boundaries.

$Nephi_1$'s combined major division Sets. With the Sets proposed for $Nephi_1$'s combined major divisions, the text is clear. The titles of his two books are identical, "The Book of Nephi", and the introductory declaration of the second book apparently refers to the same individuals involved in the first book: "Lehi", "Nephi", and his rebellious "brethren". The contextual statement of chronology in the first verse of Second Nephi is a simplistic narrative declaration, "after I Nephi had made an end of teaching my brethren". This declaration ties the first narrative of Second Nephi to $Nephi_1$'s narrative about answering his brothers' questions, which appears at the end of First Nephi. The writer's identity is not in doubt. The proposed Sets of his combined books were examined above.

Amaron's multi-generational Sets. Similarly, in the Book of Omni, the creator of this major division declares, "I Omni … had kept these plates according to the commandments of my fathers, and I conferred them upon my son Amaron".[259] The next writer states, "I Amaron write the things whatsoever I write, which are few, in the book of my father".[260] The writer's identity and relationship with the preceding writer, Omni, are not in doubt. The proposed Sets of the combined number-terms of these two writers also were examined above.

Part of the symbolism of Amaron's proposed Sets could be considered the certainty that he also understood "the commandments of [his] fathers" and had "kept these plates" correctly. His temporal-expression was required to fit into the patterns and commands created by his predecessors. In other words, while the basic witness of the proposed Sets of Amaron is the time keeping accuracy of the Nephites, a significant witness of the proposed multi-generational or combined writers' Sets may be the dedication of each succeeding writer to fulfilling the commands he had received from the previous writer. Even Omni, who noted that he had "not kept the statutes and the commandments of the Lord as [he] ought to have done", declared that

[259] Omni 1:1, 3.

[260] Omni 1:4.

his writings were being engraved to fulfill "the commandments of [his] fathers". The reader may rely on Omni's correct knowledge of those commands, on the accuracy of his number-terms, and on the reliability of the commands he delivered to his son Amaron.

Multi-generational symbolism prescribed by Enos. With the proposed multi-generational (L) number-term letter-set begun and apparently completely designed by Enos, major division boundaries of the following two books, which had not yet been created, did not appear to be considered. Those number-terms all could have been included within the Book of Enos, except for what may have been the original plan of $Nephi_1$ to eventually include seven major divisions in these plates. The personalized symbolism examined above dealt with Enos and his descendants and did not deal with their potential multi-generational or combined writers' Sets. The following analysis focuses on such potential Sets that may have been organized on the basis of the time-terms or number-terms of $Jacob_2$ and his descendants.

3.15 Combined writers' Sets based on time-terms

The analysis of proposed Sets in this Section is concerned with the 12 express or implied time-terms that follow the writings of $Nephi_1$. The associated year-related expressions all have verbal or R narrative-links and express plural or B year-terms; so, these textual features do not help to define the different Sets. The types of time-terms (long name, personalized name, or omitted name) create one textual basis that may be used to sort the 12 number-terms into multi-generational or combined writers' Sets.

3.15.1 Potential combinations

The analysis of number-terms sorted by their associated time-terms initially was limited to the number-terms related to the third and final (GH[G]HG) time-term letter-group in the small plates of Nephi. This letter-group was composed by $Jacob_2$, his descendants, and $Mormon_2$. Three of the eight proposed Sets were based on personalized or G time-terms. Five of the proposed Sets were based on omitted or H time-terms. After these Sets were identified, three additional Sets were identified, based on $Jacob_2$'s long name or D time-term being categorized with the G time-terms as an express type that also could be contrasted with the omitted or implied type.

Personalized or G time-terms. A single stated cardinal or L number-term is associated with a personalized or G time-term. Four referenced cardinal or N number-terms, which may provide no definite quantification, also are associated with personalized or G time-terms. One of the four N number-terms may be interpreted as implying the number 500 or 502. The N number-terms were deemed to provide definite quantification. The five number-terms then were analyzed by themselves and by adding them into 26 possible combinations of two or more number-terms (for a total of 31 numbers and combination sums). This process assumed that the number name expressed in a number-term was not used twice in a single combination. However, because two identical number-terms ("many hundred") both appeared to imply the number 500, it was possible for this number to be repeated in a single combination. Because the number-term "many" seemed to imply 500 or 502, a sixth number and 15 additional combinations also were possible. Thus, 47 separate numbers and combination sums were identified for examination. Of that number, 27 values were unique and 20 were duplicates (but sourced from different number-terms). Six (12.8%) of the 47 combinations (taken one at a time up to six at a time) are proposed to be represented by Sets based on G time-terms.

Omitted or H time-terms. Four stated cardinal or L number-terms are associated with omitted or H time-terms. A single referenced cardinal or N number-term also is associated with an omitted or H time-term. Again, assuming that an N number-term provides definite quantification, one may analyze these five number-terms by themselves and by adding them into 26 possible combinations of two or more number names (for a total of 31 numbers to be examined with respect to H time-terms). This process assumes that the number name expressed in a number-term is not used twice in a single combination. All 31 values are unique. Five (16.1%) of the 31 combinations (taken one at a time up to five at a time) are proposed to be Sets based on H time-terms. Each of the Sets has a single Set-sum.

Express (D and G) time-terms. $Jacob_2$'s long name or D time-term precedes the (GH[G]HG) time-term letter-group in the text following Second Nephi. The D time-term is an express time-term like the G time-terms. The combinations of D and G express time-terms also could be compared with the writers' omitted or implied time-terms. Again, the N number-terms were deemed to provide definite quantification. The six D and G number-terms were analyzed by themselves and by adding them into 57 possible combinations of two or more number-terms (for a total of 63 numbers and combination sums). This process also assumed that the number name expressed in a number-term was not used twice in a single combination. However, because two identical number-terms ("many hundred") both appeared to imply the number 500, this number could be repeated in some combinations. Because the number-term "many" could imply 500 or 502, a seventh number and 31 additional combinations were possible. Thus, 95 numbers and combination sums were identified for examination with respect to express time-terms. Of that number, 55 values were unique and 40 were duplicates (but sourced from different number-terms). Six (6.3%) of the 95 combinations (taken one at a time up to seven at a time) are proposed to be represented by Sets based on the express (D and G) time-terms.

As with the analysis of number-terms in the major divisions, the combined analysis of all number-terms following $Nephi_1$'s writings does not begin with lists of near or close accords between the unique values and the intervals listed in Table 3.A. The analysis begins with, and its proposals regarding number-term combinations are derived from, the written text. Each of the 11 proposed Sets is based on the diction, language types, and placements of year-related expressions and their narrative-links in the books of Jacob, Enos, Jarom, and Omni, and in the Words of Mormon. Even though $Nephi_1$'s last time-term is a G time-term, it is separated from the G time-term of $Jacob_2$ by a long name or D time-term. Because they are not consecutive, these G time-terms are assigned to separate (G) letter-sets. Based on the textual examination, 126 individual numbers and combination sums have been identified, of which 11 (8.7%) are proposed as Sets. Of the 86 unique values that were identified, 17 (19.8%) are proposed as Set-sums. The remaining 115 individual numbers and combination sums (91.3%) and 69 unique values (80.2%) are deemed to be incidental or ancillary to the proposed purposes of the writers' number-terms.

3.15.2 The Set with Set-contexts of 1500 and 1502 days

Set definition. The first proposed combined writers' Set that is sorted on the basis of personalized or G time-terms includes two number-terms composed by $Jacob_2$ and the first one composed by his son Enos.

Set and Set-sum illustration. The Set and its alternative Set-sums may be symbolized by the equation 500+500+500+ □ + □ = 1500 and the equation 500+500+502+ □ + □ = 1502. The empty boxes in each equation represent the second number-term composed by Enos and the

much later number-term added to the small plates by $Mormon_2$. $Jacob_2$'s G time-terms provide two of his N number-terms (500+500) to each of these equations and Enos's initial number-term (500 or 502) provides the other number-term.

Set-contexts. The Set-sum 1500 implies two close accords with the lengths of 50 30-day cycles (30x50 = 1500) and 75 20-day cycles (20x75 = 1500). The Set-sum 1502 suggests a close accord with 55 mean sidereal months (about 1502.691 days).

3.15.3 The Set with Set-contexts of 1679 and 1681 days

Set definition. The second proposed combined writers' Set sorted on the basis of G time-terms includes four number-terms composed by $Jacob_2$ and his son Enos.

Set and Set-sum illustration. The Set and its alternative Set-sums may be symbolized by the equations 500+500+500+179+ □ = 1679 and 500+500+502+179+ □ = 1681. The empty box in each equation represents the number-term added to the small plates by $Mormon_2$. $Jacob_2$'s G time-terms suggest two of his N number-terms (500+500) for each of these equations and Enos's two G time-terms suggest the other two number-terms (N = 500 or 502; L = 179).

Set-contexts. The Set-sum 1679 implies near accords with the lengths of 61.5 mean sidereal months (about 1680.282 days) and 14.5 mean synodic periods of Mercury (about 1680.224 days). The proposed Set-sum 1679 also may suggest a calendrical statement symbolized by the equation (365x4) + (73x3) = 1460+219 = 1679. The Set-sum 1681 implies close accords with the same sidereal month and synodic period of Mercury intervals.

3.15.4 The Set with Set-contexts of 1979 and 1981days

Set definition. The third proposed Set includes each of $Jacob_2$'s and Enos's number-terms that are associated with G time-terms and $Mormon_2$'s only number-term, which also appears with a G time-term. These are the only G time-terms that follow Second Nephi. The G and H time-terms composed by $Jacob_2$ suggested the possibility of a (GH[G]HG) time-term letter-group composed by his descendants, but its completion only occurred with $Mormon_2$'s G time-term.

Set and Set-sum illustration. The Set and its Set-sums may be represented by the equations 500+500+500+179+300 = 1979 and 500+500+502+179+300 = 1981.

Set-contexts. The Set-sum 1979 suggests three Set-contexts: close accords with the lengths of 67 mean synodic months (about 1978.55 days) and 22.5 mean sidereal periods of Mercury (about 1979.311 days), and a near accord with the length of 72.5 mean sidereal months (about 1980.82 days). The Set-sum 1981 also implies three Set-contexts: close accords with the lengths of 283 7-day weeks (7x283 = 1981) and 72.5 mean sidereal months, and a near accord with the length of 22.5 mean sidereal periods of Mercury.

3.15.5 The Set with a Set-context of 242 days

Set definition. The fourth of the proposed combined writers' Sets, and the first to be created with omitted or H time-terms, employs the proposed Book of Jacob number-term 42. This number-term is associated with the first (H) letter-set in the (GH[G]HG) letter-group that follows Second Nephi. This proposed Set also utilizes the first proposed number-term of Jarom (200), which may have been recorded relatively soon after the 200-year interval had occurred.

Set and Set-sum illustration. This Set and Set-sum may be represented by the equation 42+ 200+ □ + □ + □ + □ = 242. The four empty boxes represent the number-terms associated with Jarom's second temporal-expression and the temporal-expressions in the writings of Omni and Amaron, which had not yet been engraved when Jarom added his first H time-term to the apparently expected (GH[G]HG) letter-group.

Set-context. The Set-sum 242 suggests no near or close accord with the length of any interval listed in Table 3.A.

3.15.6 The Set with Set-contexts of 480 days

Set definition. The fifth of the proposed combined writers' Sets, and the second to be created with omitted or H time-terms, also employs the proposed Book of Jacob number-term 42. This proposed Set utilizes both of the proposed number-terms of Jarom (200 and 238), the latter of which appears to have been recorded relatively late in Jarom's life, when he transferred guardianship of the small plates to his son Omni.

Set and Set-sum illustration. This Set and Set-sum may be depicted by the equation 42+ 200+238+ □ + □ + □ = 480. The three empty boxes represent the number-terms associated with the writings of Omni and Amaron, which had not yet been engraved when Jarom added his latter H time-term to the apparently expected (GH[G]HG) letter-group.

Set-contexts. The Set-sum 480 suggests three Set-contexts: close accords with the lengths of 16 30-day cycles and 24 20-day cycles (30x16 = 20x24 = 480) and a near accord with the length of 17.5 mean sidereal months (about 478.129 days).

3.15.7 The Set with Set-contexts of 756 days

Set definition. The third of the proposed combined writers' Sets associated with omitted or H time-terms uses the previously mentioned number-terms of $Jacob_2$ and Jarom, together with the first of Omni's number-terms.

Set and Set-sum illustration. The proposed Set and Set-sum may be represented by the equation 42+200+238+276+ □ + □ = 756. The empty boxes represent the number-terms associated with Omni's second temporal-expression and Amaron's only temporal-expression, which had not yet been engraved when Omni added his first H time-term to the existing GHGH letter pattern.

Set-contexts. The Set-sum 756 suggests three Set-contexts: close accords with the lengths of 108 7-day weeks (7x108 = 756), 84 9-day cycles (9x84 = 756), and 2 mean synodic periods of Saturn (about 756.184 days).

3.15.8 The Set with Set-contexts of 1038 days

Set definition. The next proposed combined writers' Set uses the five number-terms of $Jacob_2$, Jarom, and Omni that are associated with omitted or H time-terms.

Set and Set-sum illustration. The proposed Set and Set-sum may be depicted by the equation 42+200+238+276+282+ □ = 1038. The empty box represents the number-term associated with the writings of Amaron, which had not yet been engraved when Omni added his latter H time-term to the apparently expected (GH[G]HG) letter-group.

Set-contexts. The Set-sum 1038 suggests a single close accord with the length of 38 mean sidereal months (about 1038.223 days) and a single near accord with the length of 3 mean eclipse years (about 1039.86 days).

3.15.9 The Set with Set-contexts of 1358 days

Set definition. The fifth and last of the proposed combined writers' Sets associated with omitted or H time-terms uses the previously mentioned number-terms of $Jacob_2$, Jarom, and Omni, together with Amaron's number-term.

Set and Set-sum illustration. The proposed Set and Set-sum may be represented by the equation 42+200+238+276+282+320 = 1358.

Set-contexts. The Set-sum 1358 implies two close accords with the lengths of 194 7-day weeks (7x194 = 1358) and 46 mean synodic months (about 1358.407 days).

3.15.10 The Set with Set-contexts of 1555 and 1557 days

Set definition. This ninth proposed combined writers' Set has been sorted on the basis of express (D and G) time-terms and includes three number-terms of $Jacob_2$ and the initial number-term of Enos. The long name or D time-term of $Jacob_2$ expressly and officially identifies the Lehi era context. The associated number-term is 55.

Set and Set-sum illustration. The Set and its alternative Set-sums may be symbolized by the equation 55+500+500+500+ □ + □ = 1555 and the equation 55+500+500+502+ □ + □ = 1557. The empty boxes in each equation represent the latter number-term of Enos, which may not have been recorded at the same time as his initial number-term, and the number-term of $Mormon_2$, which had not yet been created but eventually would be composed with an express time-term. $Jacob_2$'s express time-terms provide three of his L and N number-terms (55+500+500) to these equations and Enos's initial number-term (500 or 502) provides the other number.

Set-contexts. The Set-sum 1555 suggests no near or close accord with the length of any interval listed in Table 3.A. The Set-sum 1557 implies two Set-contexts: close accords with the lengths of 173 9-day cycles (9x173 = 1557) and 57 mean sidereal months (about 1557.335 days).

3.15.11 The Set with Set-contexts of 1734 and 1736 days

Set definition. The tenth proposed combined writers' Set also has been sorted on the basis of express (D and G) time-terms and includes five number-terms of $Jacob_2$ and Enos.

Set and Set-sum illustration. The Set and its alternative Set-sums may be represented by the equations 55+500+500+500+179+ □ = 1734 and 55+ 500+500+502+179+ □ = 1736. The empty box in each equation represents the number-term of $Mormon_2$. $Jacob_2$'s express time-terms suggest three of his L and N number-terms (55+500+500) for each of these equations and Enos's two G time-terms suggest the other two number-terms (N = 500 or 502; L = 179).

Set-contexts. The Set-sum 1734 suggests two Set-contexts, both close accords with the lengths of 63.5 mean sidereal months (about 1734.925 days) and 5 mean eclipse years (about 1733.1 days). The Set-sum 1736 implies a close accord with the length of 248 7-day weeks (7x248 = 1736) and a near accord with the length of 63.5 mean sidereal months.

3.15.12 The Set with Set-contexts of 2034 and 2036 days

Set definition. This 11th and last combined writers' Set based on time-terms includes all of $Jacob_2$'s and Enos's number-terms that are associated with express (D and G) time-terms, plus the only number-term of $Mormon_2$, which also is associated with an express or G time-term.

Set and Set-sum illustration. The proposed Set and its Set-sums may be depicted by the equations 55+500+500+500+179+300 = 2034 and 55+500+500+502+179+300 = 2036.

Set-contexts. The Set-sum 2034 suggests two Set-contexts: a close accord with the length of 226 9-day cycles (9x226 = 2034) and a near accord with the length of 74.5 mean sidereal months (about 2035.464 days). The Set-sum 2036 also implies two Set-contexts: a close accord with the length of 74.5 mean sidereal months and a near accord with the length of 69 mean synodic months (about 2037.611 days).

3.15.13 Lunar symbolism of the time-term-sorted, combined writers' number-terms

Table 3.I includes the 17 Set-sums implied by the 11 proposed combined writers' Sets noted above. The Set-sums are presented as numbers of natural days, which suggest the lunar symbolism that may have been intended by $Jacob_2$ and the subsequent generations (including $Mormon_2$) who wrote in the small plates of Nephi. Thirteen Set-sums indicate attention to the distinctive lengths of sidereal and/or synodic months. These lunar Set-contexts imply the concern of the Nephite priesthood with observing, measuring, and recording the phases and movements of the moon. The following list compares the "Set-context" means of sidereal and synodic months implied by the Set-sums and alternating periods of whole natural days (the implied close accords) with the modern estimates of these means (expressed with fractional days).

Month type	Close accords	Implied mean	Modern mean	Difference
sidereal	478 or 479 days	27.34286 days	27.32166 days	30.5 minutes
sidereal	1502 or 1503 days	27.31818 days	27.32166 days	5.0 minutes
sidereal	1557 or 1558 days	27.32456 days	27.32166 days	4.2 minutes
sidereal	1680 or 1681 days	27.3252 days	27.32166 days	5.1 minutes
sidereal	1734 or 1735 days	27.31496 days	27.32166 days	9.6 minutes
sidereal	2035 or 2036 days	27.32215 days	27.32166 days	42.3 seconds
synodic	1358 or 1359 days	29.53261 days	29.53059 days	2.9 minutes
synodic	1978 or 1979 days	29.52985 days	29.53059 days	1.1 minutes
synodic	2037 or 2038 days	29.52899 days	29.53059 days	2.3 minutes

These comparisons also do not suggest that the larger the number of days associated with a close accord, the more accurate the implied mean length of the sidereal month or synodic month will be. When sidereal months are measured with 1557 or 1558 days, the implied mean is 4.2 minutes more than the modern estimate, but when sidereal months are measured with 1734 or 1735 days, the implied mean is 9.6 minutes less than the modern estimate. When synodic months are measured with 1978 or 1979 days, the implied mean is 1.1 minutes less than the modern estimate, but when synodic months are measured with 2037 or 2038 days, the implied mean is 2.3 minutes less than the modern estimate. One implication of these data again appears to be that the Nephite observers sought to find the most accurate astronomical commensurations to improve the precision of their records and predictions.

A further implication may be the skill of the observers in identifying the positions of the moon within the constellations of fixed stars. The implied sidereal month intervals are 17.5, 38, 57, 61.5, 63.5, 72.5, and 74.5. The accords of 38 sidereal months with three eclipse years, 61.5 sidereal months with 14.5 synodic periods of Mercury, 63.5 sidereal months with five eclipse years, 72.5 sidereal months with 67 synodic months and 22.5 sidereal periods of Mercury, and 74.5 sidereal months with 69 synodic months may suggest the use of half-sidereal months (about 13.66083 days) as a standard measure of astronomical time.

3.15.14 Symbolic amplifications

Table 3.I also includes four proposed Set-contexts that suggest Nephite attention to the lengths of the synodic and sidereal periods of Mercury, the synodic period of Saturn, and the eclipse year. The "Set-context" means of the synodic and sidereal periods of Mercury suggested by the Set-sums and alternating periods of whole natural days (the implied close accords) may be compared with the modern estimates of these means (expressed with fractional days).

Period type	Close accords	Implied mean	Modern mean	Difference
synodic	1680 or 1681 days	115.89655 days	115.87754 days	27.4 minutes
sidereal	1979 or 1980 days	87.97778 days	87.96939 days	12.1 minutes

The symbolized periods of half-sidereal months and of half-sidereal and half-synodic periods of Mercury again suggest that Nephite observers were aware of more than the movements of the moon or a planet past a single fixed star. They seem to have identified constellations in the fixed stars and the motions of bright planets and the moon along their paths through the constellations.

One Set-context of the Set-sum 756 suggests Nephite attention to the length of the synodic period of Saturn. The implied close accords for 2 Saturn synodic periods are 756 or 757 days. The "Set-context" mean of the Saturn synodic period implied by 756 or 757 days is about 378.25 days, some 227.4 minutes more than the modern estimate.

A related Set-context of the Set-sum 1679 implies a calendrical symbolism similar to that of the Set-sum 803 in Second Nephi and the Set-sum 1898 in $Nephi_1$'s combined writings. In the earlier cases, Set-contexts were proposed in which a number of 365-day years occurred, followed by a period of 73 days. The suggested equations were (365x2) +73 = 803 and (365x5) +73 = 1898. In the present case, the suggested equation may be (365x4) + (73x3) = 1679. The number 73 appears to have been understood in Mesoamerica as a fifth part of the 365-day calendar (73x5 = 365) and as an eighth part of a close accord with the synodic period of Venus (73x8 = 584). As such, the number 73 may have been used for coordinating the solar year and synodic period of Venus, perhaps with seasonal agricultural and security connotations. Hence, it may be noted that the suggested equation for the present Set-sum also may be depicted as (584x2) +511 = 1679. That is, an interval of 1679 days is 73 days shorter than three synodic periods of Venus.

Eclipse years also appear to be symbolized by the combined writers' Sets. The "Set-context" means of an eclipse year (the time required for the sun to return to the same node) suggested by the Set-sums and alternating periods of whole natural days (the implied close accords) also may be compared with the modern estimate of these means (expressed with fractional days).

Eclipse years	Close accords	Implied mean	Modern mean	Difference
3	1039 or 1040 days	346.5 days	346.62 days	172.8 minutes
5	1733 or 1734 days	346.7 days	346.62 days	115.2 minutes

Again, the symbolized periods of sidereal and half-sidereal months and eclipse years may suggest that Nephite observers had a clear map of the movements of the moon and sun along their paths through the constellations and may have been measuring solar intervals in terms of sidereal or half-sidereal months.

While the Set-sum 1557 implies close accords with 57 sidereal months and 173 9-day cycles, these accords also may suggest attention to half-eclipse years. During the 173rd 9-day period, 52.5 synodic months (about 1550.356 days) and 57 draconic months (1551.097) may have exhibited a close accord. During the 174th 9-day period, 53 synodic months (about 1565.121 days) and 57.5 draconic months (about 1564.703 days) may have exhibited another close accord. In either case, these intervals all would occur within the eclipse season associated with 4.5 mean eclipse years (about 1559.79 days). The eclipse season may have begun at about 1542.54 days and lasted until about 1577.04 days. Presumably, the priest-astronomers were well aware of the movements of the moon and sun along their paths through the constellations.

3.16 Combined writers' Sets based on number-terms

The sorting of combined writers' number-terms on the basis of their two types (stated cardinal or L and referenced cardinal or N) necessarily includes the 12 number-terms recorded after the death of $Nephi_1$. However, for the purpose of defining combined writers' Sets, the division between Second Nephi and the Book of Jacob seems to have been intended to be disregarded in the same way that the separations of the books of Jacob, Enos, Jarom, Omni, and Mormon were disregarded in Section 3.15 above. Since $Jacob_2$'s L number-term immediately follows and is part of the final (L) letter-set created by $Nephi_1$, it would appear that $Nephi_1$'s final L number-term (600) may be considered a 13th number-term to be combined with the following 12 number-terms recorded by $Jacob_2$, his descendants, and $Mormon_2$.

As thus understood, the symbolism of the numbers of combined writer's stated and referenced cardinal number-terms (1+12 = 13) suggests a visionary aspect. When $Lehi_1$ was called to be a prophet, his vision of the throne of God identified "one descending out of the midst of heaven", whose "luster was above that of the sun at noonday", and "twelve others following him", whose "brightness did exceed that of the stars in the firmament". "[T]hey came down and went forth upon the face of the earth".[261] The (1+12 = 13) cardinal number-terms also suggest a prophetic fulfillment aspect of the visionary symbolism. $Nephi_1$'s last L number-term reiterated the 600-year period that was to pass before the birth of the "one" seen in vision. $Nephi_1$'s L number-term apparently was to be followed by another 12 number-terms, beginning with $Jacob_2$'s L number-term. The 12 number-terms seem to have been planned to record the passing and completion of the 600-year period, beginning with $Nephi_1$'s and $Jacob_2$'s record that "fifty and five" years had passed.

The narrative contexts of the (L) letter-set of $Nephi_1$ and $Jacob_2$ also may suggest $Nephi_1$'s developing view of the need for a separate record for the instruction of his people. As $Nephi_1$

[261] 1 Nephi 1:9-11.

initially seems to have understood the revelation to create a small set of plates, this new record was to briefly note its origin and then bring together the revelations and teachings of $Isaiah_1$, $Lehi_1$, and $Nephi_1$ regarding the prophesied Messiah and descendants of $Jacob_1$. However, $Nephi_1$ apparently came to understand that the purpose and safety of the small plates might be enhanced if they were guarded, preserved, and completed apart from the Nephite political leadership and their official plates of Nephi. $Nephi_1$ chose $Jacob_2$ to perform those tasks, with the understanding that a descendant of $Jacob_2$ would be chosen in each generation to fulfill the tasks separately from the political leaders of the Nephites.

The symbolism also may have calendrical and astronomical aspects. Seasonal and lunar periods may be measured with the numbers 12 and 13. Twelve-month lunar years with a seasonal 13th synodic month intercalated from time to time[262] were ancient uses of these numbers in the land where $Lehi_1$ and his followers originated.[263] The symbolism of 12 and 13 also may suggest a continuously cycling year composed of 12 synodic months without intercalation and a related continuous cycle of 13 sidereal month periods (almost the same length) that could be used for verifying annual observations. In this regard, the brothers' two L number-terms appear to compose an initial combined writers' Set in the small plates of Nephi, which extends the symbolism of synodic and sidereal month intervals to include draconic month symbolism, too. Thus, $Jacob_2$'s L number-term addition to $Nephi_1$'s (L) letter-set may have been designed by the brothers as an intricate visionary, prophetic, structural, calendrical, and astronomical symbolic bridge between Second Nephi and the Book of Jacob.

Moreover, for the part of the proposed design to be carried out in the future, the brothers may have contemplated that $Jacob_2$'s descendants would add nine more L number-terms (perhaps one about every 60 years) to the central (L) letter-set of a five-part, balanced and reversible (LMLML) number-term letter-group. In this possible plan, the second (M) letter-set may have been contemplated to be created by an expression like "the year of the Messiah's birth had come" or "it is the year of the Messiah's birth". The 12th and final (L) letter-set may have been contemplated to be created by a precise and emphatic temporal-expression like "even six hundred years had passed from the time that our fathers left Jerusalem" or, perhaps in reference to the expected signs of the birth having been observed in the previous 12 synodic months, "six hundred and one years had passed since our father Lehi left Jerusalem". Such a design, if it had been considered, was not realized by $Jacob_2$ or his descendants, except as to $Jacob_2$'s L number-term "fifty and five" being added to $Nephi_1$'s final (L) letter-set.

$Jacob_2$'s L number-term was followed by a three-part (NLN) number-term letter-group in the small plates of Nephi. This letter-group apparently was designed and initiated by $Jacob_2$ (with his N letter-set) when the challenge of Sherem, the threat to the small plates, and the transfer of guardianship to Enos had occurred. $Jacob_2$'s design, which he may have planned with his son Enos, was carried forward by the consecutive N and L number-terms composed by Enos, and by the L number-terms apparently planned by Enos for his descendants to record. The (NLN) letter-group was not completed with an (N) letter-set composed by a descendant of Enos because the family line of descendant-guardians of the small plates ended with Amaleki. $Mormon_2$ apparently discerned the number-term placement pattern and finished the letter-group.

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[262] $Isaiah_1$'s prophetic 65-year period is described in the first (L) letter-set of $Nephi_1$'s concluding (LML) number-term letter-group (2 Nephi 17:8). This 65-year period may suggest 24 intercalated months within the period. See Section 3.3.3 in this Part 3.

[263] See Division 2, Part 2, Sections 2.2.6 and 2.3.3.

The (LML) letter-group composed by $Nephi_1$ and concluded by $Jacob_2$ and the subsequent (NLN) letter-group were unique in the small plates of Nephi. Both alternated stated and referenced number-terms. Both exhibited basic temporal symbolism.[264]

3.16.1 Potential combinations

If the numerical values of the 13 number-terms were to be combined merely because they could be, without any textual considerations, then 8191 combinations (considered one at a time up to 13 at a time) would be possible. However, analysis of the combined writers' 13 number-terms must be based on the text. The combined writers' eight L number-terms require separate attention from their five N number-terms. Based on textual criteria, nine combined writers' Sets and 11 possible Set-sums are proposed as having been intended by the 13 number-terms. The other 8180 possible combinations of combined writers' number-terms are considered ancillary or incidental to the purposes of the writers.

The analysis begins with the initial two L number-terms of $Nephi_1$ and $Jacob_2$ (600+55) which the brothers seem to have planned together, even though the engraving of the Book of Jacob appears to have occurred late in $Jacob_2$'s life. Then the following six L number-terms that were added to the small plates by $Jacob_2$'s descendants must be examined as they each appear to have occurred. This chronological analysis of the L number terms suggests that the next two combinations may have been: first, the brothers' L number-terms plus Enos's L number-term (179); and second, the three earlier L number-terms plus the initial L number-term (200) that Enos seems to have commanded Jarom to record. Then, as each of the following L number-terms apparently required by Enos was added to the record (when the specified number of years had passed away), four more combinations became possible: the L number-terms of $Nephi_1$, $Jacob_2$, and Enos plus both of Jarom's number-terms (200+238); all the earlier recorded L number-terms plus the first of Omni's number-terms (276); all the L number-terms of $Nephi_1$, $Jacob_2$, Enos, Jarom, and Omni; and then, all the earlier recorded L number-terms plus the L number-term of Amaron (320).

With all of that being noted regarding the combined writers' eight L number-terms that began with $Nephi_1$'s final L number-term, the examination must not ignore the six L number-terms or seven express (K and L) number-terms in $Nephi_1$'s writings prior to his last L number-term. In other words, if it is assumed that his referenced (M and N) number-terms do not provide definite quantification, then his use of seven L number-terms and his design of $Jacob_2$'s L number-term suggest another textually-based combined writers' Set. This final proposed L number-term Set is composed entirely of number-terms placed into the small plates in accordance with $Nephi_1$'s precise number-term design. In addition, if it is again assumed that $Nephi_1$'s referenced (M and N) number-terms do not provide definite quantification, then his use of eight express (K and L) number-terms and his specification of $Jacob_2$'s L number-term suggest another textually-based combined writers' Set. This final proposed express (K and L) number-term Set is composed entirely of number-terms placed into the small plates in accordance with $Nephi_1$'s definite number-term design.

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[264] See Division 2, Part 2, Section 2.2.2.

The five N number-terms that follow $Nephi_1$'s writings could indicate no definite quantification; however, if they do represent definite quantification, they must be examined like the stated number-terms. Four of the N number-terms appear to have been planned by $Jacob_2$ and Enos. Conceivably, Enos recorded his initial N number-term mid-way through his tenure as guardian of the small plates, when he may have been contemplating the possibility that he and his descendants could be destroyed by the Lamanites. A break in the narratives of Enos seems to occur between Enos 1:24 and 25. The fifth and final N number-term was added to the record hundreds of years later by $Mormon_2$, at a time when he too was aware that the Nephite people had become vulnerable to Lamanite destruction. Hence, this study proposes that the eighth and ninth combinations based solely on number-term types are composed of the four consecutive N number-terms of $Jacob_2$ (500+42+500) and Enos (500 or 502), and then of the four earlier N number-terms plus the N number-term of $Mormon_2$ (300).

3.16.2 The brothers' Set with Set-contexts of 655 days

Set definition. The first proposed combined writers' Set sorted on the basis of stated cardinal or L number-terms includes $Nephi_1$'s L number-term "six hundred" in 2 Nephi 25:19 and $Jacob_2$'s following L number-term "fifty and five" in Jacob 1:1. Both L number-terms originally may have been viewed as components of a central (L) letter-set in a proposed (LMLML) letter-group that $Nephi_1$ hoped would be completed by $Jacob_2$ and his descendants.

Set and Set-sum illustration. The proposed Set and Set-sum may be depicted by the equation 600+55+ □ + □ + □ + □ + □ + □ = 655. The six empty boxes represent the L number-terms added to the small plates by Enos and his descendants.

Set-contexts. The Set-sum 655 suggests two Set-contexts: a close accord with the length of 24 mean sidereal months (about 655.72 days) and a near accord with the length of 24 mean draconic months (about 653.093 days).

3.16.3 The Set with Set-contexts of 834 days

Set definition. The second proposed combined writers' Set composed of L number-terms combines the last L number-term of $Nephi_1$ with the L number-terms of $Jacob_2$ and Enos.

Set and Set-sum illustration. The proposed Set and Set-sum may be represented by the equation 600+55+179+ □ + □ + □ + □ + □ = 834. The five empty boxes represent the L number-terms added to the small plates by the descendants of Enos.

Set-contexts. The Set-sum 834 suggests two Set-contexts: a close accord with the length of 30.5 mean sidereal months (about 833.311 days) and a near accord with the length of 9.5 mean sidereal periods of Mercury (about 835.709 days).

3.16.4 The Set with Set-contexts of 1034 days

Set definition. The third proposed combined writers' Set sorted on the basis of L number-terms includes the last L number-term of $Nephi_1$, the L number-terms of $Jacob_2$ and Enos, and the first L number-term of Jarom. Jarom's first L number-term seems to have been prescribed by Enos and recorded when 200 Lehi calendar years had passed. The narratives of Jarom initially may have ended with Jarom 1:7.

Set and Set-sum illustration. The proposed Set and Set-sum may be symbolized by the equation 600+55+179+200+ □ + □ + □ + □ = 1034. The four empty boxes represent L number-terms added to the small plates by descendants of Enos.

Set-contexts. The Set-sum 1034 implies close accords with the lengths of 35 mean synodic months (about 1033.571 days) and 38 mean draconic months (about 1034.064 days).

3.16.5 The Set with Set-contexts of 1272 days

Set definition. The fourth proposed combined writers' Set composed of L number-terms includes the last L number-term of $Nephi_1$ and all the L number-terms of $Jacob_2$, Enos, and Jarom. Jarom's final L number-term also seems to have been prescribed by Enos and recorded when 238 Lehi calendar years had passed.

Set and Set-sum illustration. The proposed Set and Set-sum may be depicted by the equation 600+55+179+200+238+ □ + □ + □ = 1272. The three empty boxes represent L number-terms added to the small plates by Omni and Amaron.

Set-contexts. The Set-sum 1272 may imply two Set-contexts. The first is a near accord with the length of 46.5 mean sidereal months (about 1270.457 days). The second may be a notable interval of synodic months. Forty-three synodic months usually would be measured with 1269 or 1270 days because the mean length of 43 synodic months is about 1269.815 days. However, for this possible interval, 25 of the 43 months apparently had been observed as 30-day months and only 18 had been observed as 29-day months: (25x30) + (18x29) = 750+522 = 1272.

3.16.6 The Set with a Set-context of 1548 days

Set definition. The fifth proposed combined writers' Set composed of L number-terms includes the last L number-term of $Nephi_1$, all the L number-terms of $Jacob_2$, Enos, and Jarom, and the first L number-term of Omni. Omni's first L number-term also appears to have been prescribed by Enos and recorded when 276 Lehi calendar years had passed. The narratives of Omni initially may have ended with Omni 1:3a or 3b.

Set and Set-sum illustration. The proposed Set and Set-sum may be represented by the equation 600+55+179+200+238+276+ □ + □ = 1548. The two empty boxes represent the last L number-term of Omni and the L number-term of Amaron.

Set-context. The Set-sum 1548 implies a single Set-context representing a close accord with the length of 172 9-day cycles (9x172 = 1548).

3.16.7 The Set with Set-contexts of 1830 days

Set definition. The sixth proposed combined writers' Set composed of L number-terms includes the last L number-term of $Nephi_1$ and all the L number-terms of $Jacob_2$, Enos, Jarom, and Omni. Omni's final L number-term also seems to have been prescribed by Enos and recorded when 282 Lehi calendar years had passed.

Set and Set-sum illustration. The proposed Set and Set-sum may be depicted by the equation 600+55+179+200+238+276+282+ □ = 1830. The empty box represents the L number-term added to the small plates by Amaron.

Set-contexts. As noted in Section 3.4.12 above, the Set-sum 1830 suggests close accords with the lengths of 61 30-day cycles (30x61 = 1830), 62 mean synodic months (about 1830.897

days), and 67 mean sidereal months (about 1830.551 days). The Set-sum 1830 also may be interpreted as suggesting a calendrical statement depicted by the equation (365x5) +5 = 1830.

3.16.8 The Set with a Set-context of 2150 days

Set definition. The seventh proposed combined writers' Set sorted on the basis of L number-terms adds the last L number-term of $Nephi_1$ with all the L number-terms of $Jacob_2$, Enos, Jarom, Omni, and Amaron.

Set and Set-sum illustration. The Set and Set-sum may be symbolized by the equation 600+ 55+179+200+238+276+282+320 = 2150.

Set-context. The Set-sum 2150 implies a single close accord with the length of 79 mean draconic months (about 2149.765 days). This interval may have been viewed as 9 natural days (a 9-day cycle) less than 79 mean sidereal months (about 2158.411 days).

3.16.9 The brothers' Set with Set-contexts of 1998 days

Set definition. The eighth proposed combined writers' Set composed of L number-terms includes all the L number-terms placed into the small plates by $Nephi_1$ and the L number-term of $Jacob_2$, which apparently was commanded by $Nephi_1$.

Set and Set-sum illustration. The Set and Set-sum may be depicted by the equation 600+8+ 600+30+40+65+500+55+179 = 1998.

Set-contexts. The Set-sum 1998 suggests a close accord with 222 9-day cycles (9x222 = 1998). In addition, this Set-sum appears to be a fifth proposed Set-sum designed by $Nephi_1$ to describe periods of time related to the Mesoamerican 819-day cycle. The symbolism of the chronological statement (819x2) +360 = 1998 is discussed in Section 3.16.14 below.

3.16.10 The brothers' Set with Set-contexts of 1999 days

Set definition. The ninth proposed combined writers' Set is based on the express (K and L) number-terms of $Nephi_1$ and $Jacob_2$. This Set that combines express number-terms in $Nephi_1$'s and $Jacob_2$'s writings complements the combined writers' Set described in Section 3.15.12 above, which included all the express (D and G) time-terms following $Nephi_1$'s writings. The K number-term "the first" that is the first number-term in First Nephi and the L number-terms placed into the small plates by $Nephi_1$ are combined with the L number-term of $Jacob_2$, which apparently was commanded by $Nephi_1$. All of the referenced and absent number-terms of $Nephi_1$ and $Jacob_2$ are excluded.

Set and Set-sum illustration. The Set and Set-sum may be depicted by the equation 1+600+ 8+600+30+40+65+500+55+179 = 1999.

Set-contexts. The Set-sum 1999 implies a near accord with 73.5 mean draconic months (about 2000.098 days). As well, this Set-sum appears to be a sixth proposed Set-sum designed by $Nephi_1$ to describe periods of time related to the Mesoamerican 819-day cycle. The symbolism of the chronological statement (819x2) +361 = 1999 also is discussed in Section 3.16.14 below.

3.16.11 The Set with Set-contexts of 1542 and 1544 days

Set definition. The first proposed combined writers' Set sorted on the basis of referenced cardinal or N number-terms in the (NLN) letter-group includes the four N number-terms of $Jacob_2$ and Enos. These number-terms constitute the first (N) letter-set after $Nephi_1$'s writings.

Set and Set-sum illustration. The Set and alternate Set-sums may be represented by the equation 500+42+500+500+ □ = 1542 and the equation 500+42+500+502+ □ = 1544. The empty box in each equation represents the final N number-term added to the small plates by $Mormon_2$.

Set-contexts. The Set-sum 1542 suggests a single near accord with the length of 56.5 mean sidereal months (about 1543.674 days). The Set-sum 1544 suggests a single close accord with the length of 56.5 mean sidereal months.

3.16.12 The Set with Set-contexts of 1842 and 1844 days

Set definition. The second proposed combined writers' Set sorted on the basis of referenced cardinal or N number-terms in the (NLN) letter-group includes the four N number-terms of $Jacob_2$ and Enos, plus the single N number-term composed by $Mormon_2$.

Set and Set-sum illustration. The Set and alternate Set-sums may be symbolized by the equations 500+42+500+500+300 = 1842 and 500+42+500+502+300 = 1844.

Set-contexts. The Set-sum 1842 appears to have no near or close accord with a chronological interval listed in Table 3.A. The Set-sum 1844 suggests two Set-contexts: a close accord with 67.5 mean sidereal months (about 1844.212 days) and a near accord with 62.5 mean synodic months (about 1845.662 days).

3.16.13 Lunar symbolism of the combined writers' number-terms sorted by their types

Table 3.J includes the 11 Set-sums implied by the nine proposed combined writers' Sets noted above. The Set-sums are presented as numbers of natural days, which suggest the lunar symbolism that may have been intended by $Nephi_1$, $Jacob_2$, and the subsequent generations (including $Mormon_2$) who wrote in the small plates of Nephi. Eight of the 11 Set-sums indicate attention to the distinctive lengths of sidereal, draconic, and/or synodic months. These lunar Set-contexts again suggest the concern of the Nephite priesthood with observing, measuring, and recording the phases and movements of the moon. The following list compares the "Set-context" means of draconic, sidereal, and synodic months implied by the Set-sums and alternating periods of whole natural days (the implied close accords) with the modern estimates of these means (expressed with fractional days).

Month type	Close accords	Implied mean	Modern mean	Difference
draconic	653 or 654 days	27.22917 days	27.21222 days	24.4 minutes
draconic	1034 or 1035 days	27.22368 days	27.21222 days	16.5 minutes
draconic	2000 or 2001 days	27.21769 days	27.21222 days	7.9 minutes
draconic	2149 or 2150 days	27.20886 days	27.21222 days	4.8 minutes
sidereal	655 or 656 days	27.3125 days	27.32166 days	13.2 minutes
sidereal	833 or 834 days	27.32787 days	27.32166 days	8.9 minutes
sidereal	1270 or 1271 days	27.32258 days	27.32166 days	1.3 minutes
sidereal	1830 or 1831 days	27.3209 days	27.32166 days	1.1 minutes

Month type	Close accords	Implied mean	Modern mean	Difference
sidereal	1543 or 1544 days	27.31858 days	27.32166 days	4.4 minutes
sidereal	1844 or 1845 days	27.32593 days	27.32166 days	6.1 minutes
synodic	1033 or 1034 days	29.52857 days	29.53059 days	2.9 minutes
synodic	1269 or 1270 days	29.52326 days	29.53059 days	10.6 minutes
synodic	1830 or 1831 days	29.52419 days	29.53059 days	9.2 minutes
synodic	1845 or 1846 days	29.528 days	29.53059 days	3.7 minutes

Again, these comparisons do not suggest that the larger the number of days associated with a close accord, the more accurate the implied mean length of the draconic, sidereal, or synodic month will be. These data also suggest that Nephite observers may have been searching for accurate astronomical commensurations to improve the precision of their records and predictions. And a further implication may be the skill of the observers in identifying the positions of the moon within the constellations of fixed stars. The implied sidereal month intervals are 24, 30.5, 46.5, 56.5, 67, and 67.5. The accords of 24 sidereal months with 24 draconic months, 30.5 sidereal months with 9.5 sidereal periods of Mercury, 46.5 sidereal months with 43 synodic months, 67 sidereal months with 62 synodic months, and 67.5 sidereal months with 62.5 synodic months also may suggest the use of sidereal months and half-sidereal months as standard measures of other astronomical periods.

3.16.14 Symbolic amplifications

Table 3.J also includes Set-contexts of the Set-sum 834 that suggest Nephite attention to the lengths of half-sidereal periods of Mercury and half-sidereal months. The related close accords of 30.5 sidereal months listed above (833 or 834 days) do not overlap with the implied close accords for 9.5 Mercury sideral periods (835 or 836 days). The "Set-context" mean of the Mercury sidereal period implied by 835 or 836 days is about 87.94737 days, some 31.7 minutes less than the modern estimate. This is a less accurate "Set-context" mean than three of the means noted in Sections 3.4.23 and 3.15.14 above. Still, the suggestion may be that the observers were aware of constellations in the fixed stars and of the movements of bright planets and the moon along their paths through the constellations.

The Set-sum 1034 suggested overlapping close accords of the lengths of 35 synodic months and 38 draconic months. Both of these intervals are a few days shorter than the length of 6 mean half-eclipse years (about 1039.86 days). In addition, the Set-sum 1548 suggested a close accord with 172 9-day cycles. In a 173rd 9-day cycle, the lengths of 52.5 mean synodic months (about 1550.356 days) and 57 mean draconic months (about 1551.097 days) reach a close accord. With a few days more, the lengths of 9 mean half-eclipse years (about 1559.79 days) and 2 mean synodic periods of Mars (about 1559.873 days) reach a close accord. These close accords also may suggest that the Set-sum 1542 represents the beginning point of an eclipse season, about 17.25 days less than the length of 9 mean half-eclipse years (1559.79-17.25 = 1542.54). Again, detailed attention to lunar months, planetary periods, and eclipse seasons may be implied.

The Set-sum 1830 duplicates the Set-sum produced by a different Set in $Nephi_1$'s combined writings. Again, the calendrical symbolism is similar to that of the Set-sum 1200 in First Nephi and the duplicate Set-sums 735 in Second Nephi. In each instance, a Set-context may be proposed in which a number of 365-day years occur, followed by a year that begins with a 5-day epagomenal period. The suggested equations are (365x3) +105 = 1200, (365x2) +5 = 735, and

(365x5) +5 = 1830. The symbolism seems identical: the represented 365-day calendar began each year with a 5-day epagomenal period instead of ending with such a period. While $Nephi_1$ appeared to be referencing a Mesoamerican 365-day calendar that was characterized by an introductory 5-day period and terminal naming, in this instance, the Set-sum 1830 is based on the temporal-expressions of the combined writers $Nephi_1$, $Jacob_2$, Enos, Jarom, and Omni. Assuming again that Enos created the number-terms recorded by Jarom and Omni, then it would appear that he also wanted to make it clear that he was familiar with a terminally named, summer era calendar that was supplanted during his lifetime by an initially named, spring era calendar.

The Set-sum 1998 is the fifth of sixth Set-sums apparently designed by $Nephi_1$ to suggest the measurement of 819-day cycles of time. Earlier, this study noted that his two Set-sums 1228 and 2048 could derive from the equations 1.5x819 = 1228 and 2.5x819 = 2048. These equations suggest the product of 4x819 or 3276, which, as an interval of natural days, has numerical connections to Mesoamerican quadripartite colors, directions, and gods. $Nephi_1$'s Set-sum 839 also was alternatively depicted above as 819+20 = (7x9x13) +20 = 839. In these depictions, the 20-day cycle may be recognized as a distinct part of the chronological statement. Apparently, the ancient 7-day, 9-day, and 13-day cycles of time (from which the 819-day cycle was derived) were to be understood as occurring with the temporal context of recurring 20-day cycles that provided a complementary structure to the passing of time. The Set-sum 1998 has been depicted with a similar form of equation, which may be alternatively represented as (819x2) +360 = (2x7x9x13) +360 = 1998. In these depictions, the 20-day cycle has been extended out to 18x20 or 360 days. The two 819-day cycles may be understood as half of a 3276-day interval. The 360-day cycle may reemphasize the temporal context of recurring 20-day cycles that provided a complementary structure to the (7x9x13) composition of color, space, and time. The Set-sums 1229 and 1999 each may represent one day more than the Set-sums 1228 and 1998 and the implication may be that both the 819-day cycle and the 20-day cycle (in 360-day blocks of time) could be understood as complementary continuous cycles. Four year bearers carried four 365-day years through four tuns (4x360) plus an additional 20 days: (4x360) +20 = 1460.

3.17 Hypothetical concluding temporal-expression

The proposal has been made in previous Sections that $Jacob_2$ and his descendants composed and placed 11 temporal-expressions in their writings and then stopped including more temporal-expressions, so that the final temporal-expression in the small plates of Nephi could record the end of $Lehi_1$'s 600-year period and the birth of the Messiah.[265] This proposal requires a concluding explanation regarding the diction, language types, and potential symbolism of the apparently contemplated final temporal-expression. The examination begins with language types suggested for this final temporal expression because they may be compared most easily with the language types of the preceding 28 temporal-expressions (Table 2.A of this Division).

3.17.1 The expected temporal-expressions

As to narrative-links, the first temporal-expression of $Jacob_2$ used a verbal or R narrative-link that completed $Nephi_1$'s previous RQRQ pattern of narrative-links and finished his balanced

[265] See Part 1, Section 1.9; Part 2, Sections 2.3.3-2.3.4; and Part 3, Section 3.8.8 in this Division 2.

and reversible patterns: (QU[Q]UQ)(RQ[R]QR). Thereafter, $Jacob_2$ and his descendants who recorded temporal-expressions only used verbal or R narrative-links that became part of $Jacob_2$'s (R) letter-set. $Mormon_2$ apparently perceived and fulfilled the commandment to use an R narrative-link in his concluding temporal-expression in the small plates of Nephi.[266] Thus, it appears likely that the final temporal-expression $Jacob_2$'s descendant was expected to record would have used a verbal or R narrative-link.

As to year-terms, $Jacob_2$'s first temporal-expression used an express plural or B year-term that continued $Nephi_1$'s previous (B) letter-set. Subsequently, $Jacob_2$ and his descendants who recorded temporal-expressions only used B year-terms that became part of $Nephi_1$'s (B) letter-set. $Mormon_2$ also observed the apparent command to use a B year-term in his concluding temporal-expression.[267] Hence, it seems expected that the final temporal-expression $Jacob_2$'s descendant was to record would have used an express plural or B year-term.

As to time-terms, the first temporal-expression of $Jacob_2$ used a long name or D time-term that formalized $Nephi_1$'s previous personalized or G time-terms that had identified the Lehi era. As an official time-term implying the measurement of $Lehi_1$'s 600-year prophecy, $Jacob_2$'s D time-term contrasted with the omitted or H time-term at the center of $Nephi_1$'s balanced and reversible time-term pattern: (GHGHG)[H](GHGHG). Following the D time-term, $Jacob_2$ and his descendants who recorded temporal-expressions created another GHGH pattern of time-terms. This pattern implies that the final temporal-expression was to complete the entire pattern apparently conceived by $Nephi_1$ to be carried out by $Jacob_2$ and his descendants: (GHGHG)[H](GHGHG)[D](GHGHG). $Mormon_2$ seems to have perceived this pattern because he used a G time-term in the Words of Mormon.[268] Thus, the final temporal-expression that $Jacob_2$'s descendant appears to have been expected to record probably would have used another personalized or G time-term.

As to number-terms, $Jacob_2$'s first temporal-expression used a stated cardinal or L number-term that apparently was intended to become part of the last (L) letter-set created by $Nephi_1$. Following the L number-term, $Jacob_2$ and his descendants who recorded temporal-expressions only used referenced cardinal or N number-terms or stated cardinal or L number-terms in a non-balanced NL pattern that implies the last temporal-expression was to use an N number-term to balance and finalize a simple (NLN) letter-group. $Mormon_2$ seems to have perceived the pattern this way because he used an N number-term in his concluding temporal-expression.[269]

The difficulty with the simplicity of the final (NLN) letter-group is that it is not concerned with verb choices (R narrative-links), years in general (B year-terms), or formal or informal types of personal or era names (D, G, or H time-terms). Instead, it is concerned solely with L or N number-terms, which deal with definite quantities, whether stated or referenced and, if referenced, then either definitely stated in some record or computable from definite statements in some record. How could $Nephi_1$ by himself, or $Nephi_1$ and $Jacob_2$ working together, have planned the stated or referenced numbers that were to be included in the record over the approximately 545 Lehi calendar years that followed $Nephi_1$'s death? They surely knew they

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[266] See Part 1, Sections 1.5, 1.9-1.10; and Part 2, Section 2.5 in this Division 2.

[267] See Part 1, Sections 1.4, 1.9-1.10; and Part 2, Section 2.3 in this Division 2.

[268] See Part 1, Sections 1.6, 1.9-1.10; and Part 2, Section 2.4 in this Division 2.

[269] See Part 1, Sections 1.7, 1.9-1.10 in this Division 2.

could not engage in specific planning for such distant times and, thus, it seems most likely that they did not attempt it. In other words, when $Jacob_2$ received the small plates from $Nephi_1$, the concluding (NLN) letter-group that now completes the number-terms in these plates likely had not been contemplated.

$Nephi_1$'s concluding (LML) number-term letter-group apparently was designed for his time and included what would become $Jacob_2$'s initial number-term, the stated cardinal or L number-term "fifty and five". This number-term specified the number of complete Lehi calendar years that $Nephi_1$ had survived and measured following his family's escape from the destruction of Jerusalem. Then, insofar as $Nephi_1$ was concerned, the following number-terms of $Jacob_2$ and/or his descendants could be just similarly simple L number-terms recorded as the following years of their lives might dictate or could include a second (M) number-term letter-set in a potential five-part, balanced and reversible (LMLML) letter-group. One of the commandments of $Nephi_1$ to $Jacob_2$ was that the things to be written on the remaining portion of the small plates should be just the "most precious" things and "should not touch save it were lightly concerning the history" of the Nephite people.[270] Hence, another 11 stated cardinal or L number-terms (following $Jacob_2$'s "fifty and five") initially may have been expected to be recorded every 50 years or so, until $Lehi_1$'s 600 years had passed. Alternatively, nine more L number-terms may have been expected to be recorded every 60 years or so, until $Lehi_1$'s 600 years had passed and the concluding M and L number-terms could be recorded. Such minimal, but specific, historical records could have been expected to become part of $Nephi_1$'s (LML) letter-group or the potential (LMLML) letter-group. However, the experiences of $Jacob_2$ and Enos decades after the death of $Nephi_1$ seem to have suggested the creation of quite a different concluding number-term letter-group.

3.17.2 The "most precious" history

$Jacob_2$ seems to have survived to shortly before the 100th anniversary of $Lehi_1$'s departure from Jerusalem. A few years before that anniversary, a challenger named Sherem led a bitter attack on the Nephite religion and charged $Jacob_2$ with blasphemy. Sherem apparently sought to wrest from the aged prophet both the religious leadership of the Nephite people and the allegedly blasphemous record on the small plates of Nephi. Sherem's challenge was miraculously defeated and the plates were preserved. $Jacob_2$ then recorded the event and, in so doing, he appears to have sought to verify his faithfulness in recording the passing of time by symbolizing the chronological skills and record keeping of Nephite priest-astronomers. He was able to do this with three referenced cardinal or N number-terms that referred back to $Nephi_1$'s use of two central N number-terms recorded in the narrative context of enmity and death threats from the elder brothers $Laman_1$ and Lemuel.[271] $Jacob_2$ also had faced enmity and the threat of a violent, prejudiced, and untimely death.

$Jacob_2$'s son Enos, who became the next guardian of the small plates, seems to have expressed his unity with his father by recording a fourth N number-term related to the events involving his father's offer and his acceptance of the guardianship of the small plates. Enos also appears to have lived a long life. The stated cardinal or (L) letter-set he created near the end of

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[270] Jacob 1:2.

[271] See Section 3.5 above.

his life and the five L number-terms that he seems to have specified for his descendants to record appear to have accomplished four of Enos's evident purposes. First, the exacting nature of the work of priest-astronomers in and about the land of Nephi would be symbolized in the same ways that $Nephi_1$ and $Jacob_2$ had done. Second, the unquestionable passing of 179 Lehi calendar years in the social and historical context of the Nephite priest-astronomers' work would be recorded. Third, the final number-term letter-group created by $Jacob_2$ and his descendants would balance and refer back to the final number-term letter-group created by $Nephi_1$; however, the positions of the stated and referenced number-terms and the types of referenced number-terms would be switched: (LML)(NLN). Fourth, the unique spring equinox inauguration of a 1507-year solar and synodic month era during the lifetime of Enos would be symbolized in a personalized way.[272]

If $Amaleki_1$ had fathered a descendant who survived him, received the small plates, and continued $Jacob_2$'s family line with successive guardians of the plates down to the time of the Messiah's birth, then a descendant of $Jacob_2$ would have been required to add the final N number-term to the (NLN) letter-set that seems to have been planned by $Jacob_2$ and Enos, and later apparently specified in greater detail by Enos. Alternatively, if $Amaleki_1$'s brother had not become lost to $Amaleki_1$ but had survived him, received the small plates, and continued $Jacob_2$'s family line with successive guardians of the plates down to the time of the Messiah's birth, then a different descendant of $Jacob_2$ would have been required to add the last N number-term to the (NLN) letter-set. In either case, the descendant who composed the concluding N number-term apparently would have been required by the commandments of his fathers to make it part of an RBGN temporal-expression, the 12th and final temporal-expression to be created by $Jacob_2$ and his descendants.

What might the diction of the concluding N number-term have been? From $Nephi_1$'s earlier choices, it may have specified "these many" years. From $Jacob_2$'s choices, it may have specified "some" years or "many hundred" years. From the choice of Enos, it may have specified "many" years.[273] But the diction also may have been unique to its temporal-expression, perhaps: "the many" as in "the many years prophesied by Lehi had passed"; "the" as in "the years have been accomplished since our father Lehi left Jerusalem"; or "the prophesied" as in "the prophesied years of Lehi have ended". Other alternative RBGN expressions could be devised. However, in each of the hypothetical expressions, the diction of the definite number-term being referenced most likely would have been "even six hundred", the number-term of the prophecy of $Lehi_1$ initially recorded by $Nephi_1$.[274] This probable number-term suggests a final, hypothetical Set of N number-terms that could have been anticipated and planned by $Jacob_2$ and Enos.

3.17.3 The hypothetical Set with Set-contexts of 2142 and 2144 days

Set definition. The hypothetical combined writers' Set sorted on the basis of referenced cardinal or N number-terms in the (NLN) letter-group includes the four N number-terms of $Jacob_2$ and Enos, plus the N number-term expected to be recorded by a descendant of $Jacob_2$.

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[272] See Sections 3.6 and 3.12 above.

[273] 1 Nephi 17:20-21; Jacob 4:4; 7:1, 7; Enos 1:8.

[274] 1 Nephi 10:4.

Set and Set-sum illustration. The Set and alternate Set-sums may be symbolized by the equations 500+42+500+500+600 = 2142 and 500+42+500+502+600 = 2144.

Set-contexts. The Set-sum 2142 may imply four Set-contexts: close accords with the lengths of 306 7-day weeks and 238 9-day cycles (7x306 = 9x238 = 2142); and near accords with the lengths of 72.5 mean synodic months (about 2140.968 days) and 18.5 mean synodic periods of Mercury (about 2143.734 days). Assuming that Nephite synodic months were measured from the astronomical new moon (as the ancient Egyptian lunar months appear to have been), the interval of 72.5 months would reach the first full moon of a seventh 12-month lunar year or a fifth 18-month lunar year. Alternatively, if Nephite synodic months were measured from the full moon, the interval of 72.5 months would reach the first astronomical new moon of a seventh 12-month lunar year or a fifth 18-month lunar year. The Set-sum 2144 suggests two Set-contexts: close accords with the lengths of 78.5 mean sidereal months (about 2144.75 days) and 18.5 synodic periods of Mercury. These hypothetical Set-contexts may suggest that $Jacob_2$ and Enos accounted for this last N number-term during the creation of their (N) letter-set.

3.18 Conclusion

$Nephi_1$'s Sets, Set-sums, and Set-contexts dominate the chronological symbolism of number-terms in the small plates of Nephi. Forty (69.0%) of the proposed Sets in the major divisions and nine (40.9%) of the proposed Sets of the combined writers are based on the diction of $Nephi_1$'s temporal-expressions. Of the 125 alternative Set-sums in the major divisions, 105 (84.0%) appear to have been $Nephi_1$'s intentional creations. Of the 30 proposed Set-sums of the combined writers, however, his nine Set-sums represent just 30.0%. As to the proposed Set-contexts, $Nephi_1$'s writings imply 216 (85.7%) in the major divisions, but just 18 (30.5%) in the combined writers analysis (Tables 3.K, 3.L, 3.M, and 3.N).

After $Nephi_1$, the dominant influence in the creation of Sets, Set-sums, and Set-contexts appears to have come from Enos. His number-term creations are integral to just three Sets (5.2%) in the major divisions analysis, but 14 Sets (63.6%) in the combined writers analysis use his number-terms. Within the major divisions, the Book of Enos produces only five Set-sums (4.0%), but among the combined writers, his number-terms are part of 22 Set-sums (73.3%). As to the proposed Set-contexts, the number-terms of Enos imply ten (4.0%) in the major divisions, but they are integral to 42 (71.2%) in the combined writers analysis. Furthermore, if it is assumed that Enos specified the number-terms that were to appear in the (L) number-term letter-set he initiated, then his influence extends to 13 (22.4%) of the proposed Sets, 15 (12.0%) of the Set-sums, and 26 (10.3%) of the Set-contexts in the major divisions, and to 19 (86.4%) of the proposed Sets, 27 (90.0%) of the Set-sums, and 53 (89.8%) of the implied Set-contexts in the combined writers analysis.

Beyond those statistics regarding the influence of Enos, his Set-contexts and apparent specifications of the number-terms may be chronologically characterized by their emphasis on sidereal months (Table 3.O) and 7-day, 9-day, and 20-day cycles (Table 3.P). While $Nephi_1$'s number-terms may suggest a number of different year cycles (Table 3.Q) and planetary periods (Table 3.R), the number-terms recorded or apparently specified by Enos rarely suggest any of such chronological intervals. His descendants emphasized their genealogical duties as guardians of the small plates, but the Book of Enos itself does not mention how or from whom he obtained the plates or to whom he delivered the plates. His father had supplied some of that information in the Book of Jacob and his son supplied the rest in the Book of Jarom. $Jacob_2$'s most official

temporal-expression used the formality of the Lehi era long name to describe the time when he received the small plates from $Nephi_1$. Enos, however, personalized the diction of the long name by identifying $Lehi_1$ as "our father". Enos's time-term became simultaneously official, genealogical, and personal to each of the guardians of the small plates of Nephi. He apparently commanded his descendants to omit all time-terms in their temporal-expressions that added number-terms to the (L) letter-set Enos had created. Their temporal-expressions were to look back to his unique identification of the Lehi era. Indeed, Enos appears to have specified even the diction of the verbal narrative-links ("had passed") that his descendants were to use in the temporal-expressions that added to his (L) letter-set.

3.18.1 Mesoamerican connections

Enos also may have specified the number-terms his descendants were to add to his (L) letter-set. The three "consecutive" 38-year intervals interrupted by a six-year interval and the two consecutive 44-year intervals suggest some kind of intentional order in the choice of 200, 238, 276, 282, and 320 as the stated cardinal number-terms added by his descendants. One aspect of that order may have been Enos's intent to personalize these L number-terms in a unique way that his descendants also could look back to, somewhat like his personalization of the crucial time-term he used when creating his (L) letter-set.

As proposed in Section 3.12.6 above, Enos appears to have used the number series 200, 238, 276, 282, and 320 to symbolize the inauguration of the Kaminaljuyu calendar. This calendar restored the form of the ancient Pre-Cuicuilco calendar, with its initial year naming, New Year on the first day, little New Year on the 261st day, and month X as the last month of the 365-day calendar. In addition, the Kaminaljuyu calendar apparently represented an innovation that moved forward from the uncertainties of the autumn equinox solar era associated with the Pre-Cuicuilco calendar, that adopted the solar era advances in understanding evidenced by the terminally named Cuicuilco summer solstice calendar and its offspring (the Olmec and Izapa calendars), and that applied those advances to a 1507-year spring equinox era.

This crucial calendar modification and creation of a new solar and synodic month era appears to have occurred during the lifetime of Enos. Wherever and however this innovation originated, it appears to have provided Enos the opportunity to distinctively personalize the symbolism of the number-terms that would be added to his (L) letter-set. This was an innovation that his descendants could look back to and carry forward in their certification of the remainder of the Lehi era context.

To be sure, many symbolic connections with Mesoamerican day cycles, calendars, and calendrical practices have been proposed in the three Parts of this Division. Caution is reasonable with respect to the acceptance of such proposals because there is precious little that is certain about Preclassic Mesoamerican time keeping. The elements that may be inferred rationally from Classic, Postclassic, and Colonial period artifacts appear to require significant assumptions regarding their origins. Edmonson's creative use of the mathematical lockstep characteristics of the Calendar Round and its components, together with a few artifacts having a settled provenience and ethnological studies in the last century, reasonably suggested his calendrical genealogy. However, caution in relying on the proposed symbolic connections is still warranted.

3.18.2 Prologue

Caution also is justified by the textual facts. The part of the *Book of Mormon* text that may be characterized as the small plates of Nephi contains just 29 (6.8%) of the 426 extant temporal-expressions. The plates of Mormon, the portion of the text to be examined in Division 3 of this source book, contains 363 (85.2%) of the 426 expressions and, as Division 1 proposed, the structure of $Mormon_2$'s temporal-expressions is more semantically complex than the relatively simple emphasis on linguistic structure in most of the temporal-expressions in the small plates of Nephi. Certainly, the year-related diction in both sets of plates is similar, as are the general chronological themes of $Lehi_1$'s Messianic prophecy and the timing of the great Jewish prophet's birth. As $Lehi_1$ declared, that prophet would become both the Messiah of the children of Israel and the Savior of the world. In addition, the calendrical records related to the Lehi and Judges eras mentioned in the plates of Mormon, as they apparently marked out the ancient synodic month count of time, create continuity with the calendrical records in the small plates of Nephi.

Thus, it should come as no surprise to careful readers of the *Book of Mormon* that $Mormon_2$, apparently writing relatively early in the Mesoamerican Classic period, clearly symbolized that the 105-day calendar adjustment prefigured by the Kaminaljuyu calendar had been recognized. He noted what was then the ancient abandonment of the official 12-month lunar calendars of the Lehi and Judges eras, and the reckoning of a new Nephite Christian or NC era nine years following the signs of the Messiah's birth. The symbolism of $Mormon_2$'s number-term Sets, Set-sums, and Set-contexts is clear; they record the time of that important adoption of an official, Nephite, 365-day calendar.

Edmonson projected a 105-day anti-leap-year adjustment to the Kaminaljuyu calendar in 1 BCE,[275] but such an adjustment was not entirely justified astronomically after only 432 years had followed the Kaminaljuyu calendar inauguration in 433 BCE. The misalignment of a 365-day calendar and the tropical year aggregates at the rate of about 0.242199 days per tropical year, which means that about 105/0.242199 = 433.528 years must pass before a complete 105-day adjustment is justified. Hence, in terms of calendrical adjustments at the spring equinox, none was astronomically necessary until 21 March 2 CE 13 Deer [5 G Kaminaljuyu calendar = 7 A Pre-Cuicuilco calendar = 6 G Cuicuilco calendar = 6 G Olmec calendar = 5 G Izapa calendar = 10 G or Kej Tikal calendar] 7.17.19.17.7 (1721870)—a five-part, balanced and reversible, spring equinox day name that the priest-astronomers appear to have predicted in the Long Count calendar more than 100 years before Edmonson's proposed official inauguration of such calendar. Of course, a rough calculation for the adjustment may have permitted 105 days to be deleted and the Type II year bearers of the Kaminaljuyu calendar to be maintained at the spring equinox of 21 March in 1 BCE (11 Quake), 1 CE (12 Wind), 2 CE (13 Deer), or 3 CE (1 Jaw).

According to $Mormon_2$'s record, the Nephites seem to have waited until 21 March 5 CE before retrospectively inaugurating the institution of their spring era calendar on 21 March 5 BCE (6 Owl?), a 365-day calendar with Type I year bearers and sacred calendar day names that divided the year into a 260-day "commencement" and 105-day "latter end". $Mormon_2$ does not expressly mention why the Nephites waited nine years after the Messiah's birth to officially

[275] Edmonson, *The Book of the Year: Middle American Calendrical Systems*, 121.

adopt this calendar, but his symbolism in the text of the plates of Mormon helps to imply the reasons. This kind of chronological detail suggests the need for a thorough analysis of year-related expressions and their narrative-links in the plates of Mormon. And this examination may now be informed by the chronological structure and symbolism of $Nephi_1$, $Jacob_2$, $Jacob_2$'s descendants, and, hundreds of years later $Mormon_2$ himself, in the small plates of Nephi. A complete analysis of the structure and symbolism of temporal-expressions in the plates of Mormon is now ready to begin.