

NUMERALS



1. A number is an amount or a quantity of units. It is also a character or symbol, such as a figure or word, which expresses such a magnitude. In the latter sense “number” is synonymous with “numeral.” The statement of a number or numeral in the form of a word or words is a usage found regularly in the Bible. Examples are: in the Hebrew text of Gen 5:3, “thirty and a hundred years” (שלשים ומאה שנה), i.e., “one hundred and thirty years”; in the Greek text of Matt 4:2, “forty days and forty nights” (ἡμέρας τεσσαράκοντα καὶ τεσσαράκοντα νύκτας); and in the Latin text of Luke 3:1, “in the fifteenth year” (*anno quinto decimo*).

2. A number or numeral may also be expressed by a figure or symbol. In the development of such figures or symbols, several principles are recognizable. In an “acrophonic” system the initial letter of the word by which a number is called is used to represent the number itself. In an “alphabetic” system the sequential characters of the alphabet serve as numbers. In a system of what we may call “arbitrary” signs, accepted or conventional symbols are employed as figures. From very early times, as on the Palermo Stone (§148) for example, use was made simply of a straight mark or a succession of straight marks for at least the smaller numbers. Where individual symbols do not extend far enough to encompass all desired magnitudes, it is possible to make combinations of them to gain the desired result. In the combination the placement of the individual symbols may indicate the addition, or in some cases the subtraction, of the respective components.

3. In manuscripts and inscriptions where a numerical symbol, particularly an alphabetic character, might be relatively difficult to recognize as having this meaning, attention may be called to it as a numeral by leaving space around it or adding some mark of punctuation. In modern transcriptions it is often customary to use a mark above the line and following the letter like an acute accent, or also below the line and preceding the letter, to indicate numerals.

1. Hebrew Numerals

LITERATURE: Caspar **Levias**, “Numbers and Numerals,” in *JE* 9:348–350.

4. The letters of the Hebrew alphabet are used for numerals as shown in Table 1.

TABLE 1. *Hebrew Numerals*

א	Aleph	1	י	Yodh	10	ק	Qoph	100
ב	Beth	2	כ	Kaph	20	ר	Resh	200
ג	Gimel	3	ל	Lamedh	30	ש	S(h)in	300
ד	Daleth	4	מ	Mem	40	ת	Taw	400
ה	He	5	נ	Nun	50			
ו	Waw	6	ס	Samekh	60			
ז	Zayin	7	ע	Ayin	70			
ח	Heth	8	פ	Pe	80			
ט	Teth	9	צ	Tsadhe	90			

To distinguish a character as a numeral an accent may be placed after it. Numbers which exceed the limits of the sequence of letters are formed by addition of characters. These composite groups are written thus, for example: ק"ה = 500, ק"ת = 900.

2. Greek Numerals

LITERATURE: Leonard **Whibley**, ed., *A Companion to Greek Studies* (4th ed.; Cambridge: Cambridge University Press, 1931), 698–699; A. G. **Woodhead**, *The Study of Greek Inscriptions* (Cambridge: Cambridge University Press, 1959), 107–111.

5. In early Greek, simple straight vertical marks were used for the numbers one to four. Beyond that point the initial letters of the names of the numerals were employed. Thus, for example, Ϟ (now written Π) = πέντε = 5, Δ = δέκα = 10, ΔΙ = 11, etc. This acrophonic system is attested from the fifth century to around 100 B.C.

6. From the first century B.C. to the end of the Roman empire and on into the Byzantine period, the less cumbersome alphabetic system was mainly used. The complete Ionic alphabet was employed including three signs now obsolete.

Ϟ	or	Ϝ	Stigma or vau/digamma
Ϙ	or	ϙ	Koppa
Ϡ	or	ϡ	Sampi

The numerical values of the letters of the alphabet are shown in Table 2.

TABLE 2. *Greek Numerals*

α	Alpha	1	ι	Iota	10	ρ	Rho	100
β	Beta	2	κ	Kappa	20	σ	Sigma	200
γ	Gamma	3	λ	Lambda	30	τ	Tau	300
δ	Delta	4	μ	Mu	40	υ	Upsilon	400
ε	Epsilon	5	ν	Nu	50	φ	Phi	500
Ϝ	Vau	6	ξ	Xi	60	χ	Chi	600
ζ	Zeta	7	ο	Omicron	70	ψ	Psi	700
η	Eta	8	π	Pi	80	ω	Omega	800
θ	Theta	9	Ϟ	Koppa	90	Ϡ	Sampi	900

To indicate the numerical employment of the letters a mark like an acute accent is placed after the character or characters up through 999; a similar mark is used below the line and preceding the letter for 1000 and above. Thus, for example, φνε´ = 555, εφνε´ = 5555, etc. in the inscriptions and the papyri dates are given with the word έτος, “year,” or έτους, “years,” and this is often abbreviated to λ.

3. Roman Numerals

LITERATURE: David E. **Smith**, “Roman Numerals,” *EB* 16:612–613.

7. As in Greek, where in one system simple upright strokes were used for numbers one to four, so also in Latin the numerical system begins with I, II, III, IIII, and then goes on with other characters, V, X, L, C, and M, the derivation of which is at least in some cases recognizable as following the acrophonic principle, e.g., C = *centum* = 100, M = *mille* = 1,000. Similarly, too, addition and also subtraction of characters gives composite numbers, e.g., MC = 1,100, CM = 900, etc. Thousands are indicated by overlining. The elements of the system are shown in Table 3.

TABLE 3. *Roman Numerals*

I	1	XI	11	XXX	30
II	2	XII	12	XL	40
III	3	XIII	13	L	50
IIII or IV	4	XIIII or XIV	14	C	100
V	5	XV	15	D	500
VI	6	XVI	16	M	1,000
VII	7	XVII	17	π	2,000
VIII	8	XVIII	18		
VIIII or IX	9	XVIIII or XIX	19		
X	10	XX	20		

THE RECKONING OF TIME IN THE ANCIENT WORLD



A. UNITS OF TIME

LITERATURE: Cyrus **Adler**, “Calendar, History of,” *JE* 3:498–501; Michael **Friedländer**, “Calendar,” *JE* 3:501–508; F. H. **Colson**, *The Week: An Essay on the Origin & Development of the Seven-day Cycle* (Cambridge: Cambridge University Press, 1926; repr., Westport, Conn.: Greenwood, [1974]); C. W. C. **Barlow** and G. H. **Bryan**, *Elementary Mathematical Astronomy* (London: University Tutorial Press, 1933); Henry N. **Russell**, Raymond S. **Dugan**, and John Q. **Stewart**, *Astronomy: A Revision of Young’s Manual of Astronomy*, vol. 1., *The Solar System* (rev. ed.; Boston: Ginn, 1945); *The American Ephemeris and Nautical Almanac* (Washington: U. S. Government Printing Office, 1855-1980); A. **Hermann**, F. **Schmidtke**, and L. **Koep**, *RAC* 3:30–60; Roland de **Vaux**, *Ancient Israel: Its Life and Institutions* (New York: McGraw-Hill, 1961), 178–194; Jerome **Wyckoff**, ed., *The Harper Encyclopedia of Science* (New York: Harper & Row, 1963); E. J. **Bickerman**, *Chronology of the Ancient World* (London: Thames & Hudson, 1968); Norriss S. **Hetherington**, *Ancient Astronomy and Civilization* (Tucson: Pachart, 1987).¹

8. The chief units in the reckoning of time for calendrical purposes are the day, week, month, and year, while the year is also divided into seasons and the day into hours or other parts. Rev 9:15 mentions the units: hour, day, month, and year; and Gal 4:10 speaks of days, months, seasons, and years.

1. The Day

LITERATURE: Edouard **Mahler**, *Handbuch der jüdischen Chronologie* (Leipzig: Gustav Fock, 1916); Solomon **Zeitlin**, “The Beginning of the Jewish Day during the Second Commonwealth,” *JQR* 36 (1945–46): 403–414.

¹Initial reference to Barlow and Bryan and Wyckoff from Harold F. Weaver, Professor Emeritus of Astronomy, University of California, Berkeley.

9. In the Sumerian and Akkadian languages the word for “day” also means “wind.” Likewise in Song Sol 2:17 and 4:6 it is said that “the day breathes” or literally that it blows, which can suggest that the daily land and sea breezes of the Mesopotamian and Palestinian coastlands were associated with the thought of the “day.”²

10. Of all the recurrent phenomena of nature, however, the surely most impressive and universally observable, and therefore surely the most influential in the concept of the “day,” is the rising and setting of the sun with the consequent alternation of a period of light and a period of darkness. Thus in Gen 1:3–5 the first of the works of creation was “light” in distinction from “darkness,” and the light was called day, in Hebrew יום (*yom*), the darkness night, לילה (*laylah*). Thus “day” can have the sense of daytime as distinct from nighttime, but the same word can also comprehend the complete cycle which includes both the daytime and the nighttime: “And there was evening and there was morning, one day” (Gen 1:5). In Greek the corresponding word ἡμέρα is used for the daytime as, for example, in Matt 4:2 where Jesus fasted for “forty days and forty nights.” For the complete cycle of light and darkness there is a word, νυκθήμερον, which combines “night” (νύξ) and “day” (ἡμέρα) in one term. This is used in 2 Cor 11:25 where it is translated “a night and a day.” Usually, however, the “day” which includes the nighttime and the daytime is simply designated with the word ἡμέρα and the context makes plain what is meant as, for example, in John 2:12 or Acts 9:19 where the several “days” are certainly several successive periods each comprising daytime and nighttime.³

11. A “day” in the sense of a complete period of light and darkness might be reckoned as beginning with the coming of the light or with the coming of the darkness, as well as of course theoretically at any other point. In ancient Egypt the day probably began at dawn,⁴ in ancient Mesopotamia it began in the evening.⁵ Among the Greeks the day was reckoned from sunset to sunset, while the Romans already began the day in the “modern” fashion at midnight.⁶ Summing up the different reckonings among different people in his time Pliny wrote:

The Babylonians count the period between two sunrises, the Athenians that between two sunsets, the Umbrians from midday to midday, the common people everywhere from dawn to dark, the Roman priests and the authorities who fixed the official day, and also the Egyptians and Hipparchus, the period from midnight to midnight.⁷

12. In the Old Testament the earlier practice seems to have been to consider that the day began in the morning. In Gen 19:34, for example, the

²Lewy, *HUCA* 17 (1942–43): 5–6.

³Mahler, *Handbuch*, 170–171.

⁴PCAE 10.

⁵PDBC 26.

⁶James Gow, *A Companion to School Classics* (3d ed.; London: Macmillan, 1893), 78, 147; Leonard Whibley, ed., *A Companion to Greek Studies* (3d ed.; Cambridge: Cambridge University Press, 1916), 589.

⁷*Natural History* 2.79.188.

“morrow” (ASV) or “next day” (RSV) clearly begins with the morning after the preceding night. The later practice was to count the day as beginning in the evening. In Lev 23:27 it is stated that the Day of Atonement is to be observed on the tenth day of the seventh month; in verse 32 it is said that the observance is to be “on the ninth day of the month beginning at evening, from evening to evening.” These last words can hardly be intended to change the actual date of the fast; rather, they appear to be an addition which simply defines what the tenth day of the month was at a time when the day had come to be reckoned as beginning in the evening: the tenth day of the month is the day which begins on the evening of the ninth and continues until the following evening. In making the shift from a morning reckoning to an evening reckoning, the “day” was therefore in fact moved back so that it began a half day earlier than had been the case previously.⁸

13. In the New Testament in the Synoptic Gospels and Acts the day seems usually to be considered as beginning in the morning. Mark 11:11 states that Jesus entered Jerusalem, went into the temple, and when he had looked at everything, since it was “now eventide” (ASV) or “already late” (RSV), went out to Bethany with the twelve; verse 12 continues the narrative and tells that on the “morrow” (ASV) or the “following day” (RSV) they came back to the city. It is evident that the new day has begun with the morning following the preceding evening. Likewise Matt 28:1, Mark 16:1f., and Luke 23:56–24:1 all picture the first day of the week beginning with the dawn following the preceding Sabbath. And Acts 4:3, for an example in that book, tells how Peter and John were put in custody “until the morrow, for it was already evening,” thus clearly indicating that the new day would begin the next morning. It has been suggested that this counting of the day as beginning with the morning is a continuation of the earlier Old Testament practice already described (§12), and that this usage was maintained in parts of Galilee and was followed by Jesus and the early disciples, which would account for its appearing so frequently in the Synoptic Gospels and Acts.⁹ On the other hand, even though the common reckoning in the Synoptic Gospels is from the morning, in Mark 1:32 = Luke 4:40, the later Old Testament (§12) and Jewish usage of counting the one day as ending and the next as beginning at sunset is plainly reflected in the fact that the people of Capernaum were free to bring the sick to Jesus at sunset when the Sabbath came to an end. As for the Fourth Gospel, in John 20:1 Mary Magdalene comes to the tomb while it is still dark, yet it is already “on the first day of the week.” This can be explained by supposing that the late Old Testament and Jewish usage is in view, according to which the new day had begun at the preceding sunset, or it can be explained equally well by supposing that John is giving the description in terms of the official Roman day which, as Pliny told us (§11), began at midnight. In either case, the new day had begun already before the sunrise.

14. The coming of light and the coming of darkness are, of course, gradual events, and it is therefore to periods of transition which are not

⁸ Julian Morgenstern, *HUCA* 10 (1935): 15–28; 20 (1947): 34–38.

⁹ Morgenstern, *Crozer Quarterly*, 26 (1949): 232–240.

necessarily sharply defined that the terms “morning” and “evening,” as also “dawn” (e.g. Judg 19:25f.) and “twilight” (e.g. 1 Sam 30:17), refer. For a more precise line of demarcation between one day and the next the time of sunrise or sunset could be taken, and we have seen probable examples of such usage in Mark 16:2 and Mark 1:32, respectively. Or the determination could be made in terms of the intensity of the light or the completeness of the darkness. For example, it was held by the Jewish rabbis that Deut 6:4–7 required the recitation of the Shema in the evening and in the morning, and in the Talmud there is found an extended discussion of exactly what times are thereby intended. The recital could begin in the morning, it was declared, as soon as one could distinguish between blue and white (or between blue and green, as another rabbi taught), and it must be finished before sunrise.¹⁰ As for the evening, Neh 4:21 was cited, where work went on “till the stars came out,” and from that analogy it was shown that the appearance of the stars was the sign that the day had ended and the recital could begin.¹¹ Thus, in the morning it was either the dawning light or the following sunrise, and in the evening it was either the sunset or the ensuing nightfall, when the stars became visible, that provided the line of demarcation.¹²

15. Parts of the day were described at an early time in terms of the customary occupation then performed as, for example, the “time for animals to be gathered together” (Gen 29:7), or “the time when women go out to draw water” (Gen 24:11). The nighttime was divided into watches. Lam 2:19 speaks of “the beginning of the watches,” Judg 7:19 mentions “the middle watch,” and Exod 14:24 and I Sam 11:11 refer to “the morning watch.” The rabbis debated whether there were three watches or four.¹³ In the New Testament, as in Roman and Egyptian practice, we find four watches of the night: evening, midnight, cockcrow, and morning (Matt 14:25; Mark 13:35).¹⁴ The daytime had recognizable periods such as “the heat of the day” (Gen 18:1) and “the cool of the day” (Gen 3:8), and was also divided broadly into morning, noon, and evening (Psa 55:17). A division of the daytime into three parts, and of the nighttime into three parts, is mentioned in *Jub.* 49:10,12.¹⁵

16. The word “hour” שעה (*sha'ah*), occurs several times in Daniel (3:6, etc.) in Aramaic, and is common in later Hebrew. In Daniel it still denotes simply a short period of time and the phrase “the same hour” (ASV) may properly be translated “immediately” (RSV). In Greek the corresponding word is ὥρα, and it too is used for an inexactly defined period of time, as for example in John 5:35, where πρὸς ὥραν is translated “for a while.”

¹⁰*Berakot* 1:2; Danby 2.

¹¹*Berakot* 2b; Epstein, *BT* 3.

¹²As the line between one day and the next, nightfall was later defined more precisely as the moment when three stars of the second magnitude became visible. Friedländer, *JE* 3: 501.

¹³*Berakot* 3a–b; Epstein, *BT* 5–8.

¹⁴R. de Vaux, *RB* 73 (1966): 146–147, review of FHBC.

¹⁵*APOT* 2:80.

17. In Mesopotamia the entire day was divided into twelve periods of what we would call two hours each.¹⁶ Herodotus (2.109) refers to these “twelve divisions (μέρεα) of the day,” and observes that the Greeks learned of them from the Babylonians. Among the Greeks themselves the day and the night were each divided into twelve hours.¹⁷ These hours naturally varied in length depending upon the time of year and were known as ὥραι καιρικαί. For scientific purposes, an hour of standard length was used, the entire day (νυχθήμερον) being divided into twenty-four periods of equal length. The astronomer Hipparchus (c. 150 B.C.) speaks of these “equinoctial hours” (ὥραι ἰσημεριναί),¹⁸ as he calls them, and Ptolemy¹⁹ also distinguishes between ordinary and equinoctial hours. In order to measure the hours, there were available for the time when the sun was shining the sunclock (πόλος) and the sundial (γνώμων), which are mentioned by Herodotus in the passage cited just above with the statement that they came from Babylonia. The same principle of measurement by the shadow of the sun was, of course, also known in Egypt, where the obelisks were evidently used for astronomical measurements.²⁰ For the measurement of time during the darkness as well as the light, there was the water clock (κλεψύδρα), which is mentioned by Aristotle²¹ and others.

18. The division of the day into twelve hours appears in John 11:9 where it is asked, “Are there not twelve hours in the day?” Likewise in Matt 20:1–12 the householder goes to hire laborers early in the morning, and again at the third, sixth, ninth and eleventh hours, and the last ones have only one hour of work before the end of the day. As we saw above (§11), Pliny tells us that the common people everywhere reckoned the day from dawn to dark, so the twelve hours were presumably counted within that period. If an average daytime lasting from six a.m. to six p.m. was taken as the basis, then the third hour was what we would call nine o’clock in the morning, and so on. In the Talmud²² there is a discussion in connection with the testimony of witnesses of the extent of reasonable error in a man’s estimate of what the hour is, and it is noted that “in the sixth hour the sun stands in the meridian.”

19. In the Fourth Gospel, on the other hand, we saw (§13) that the day must have been reckoned from the preceding midnight, according to what Pliny (§11) tells us was official Roman usage. In this “modern” reckoning of the day from midnight, the first twelve hours would extend from midnight to midday, and another twelve hours would cover the time from midday to the next midnight. When various hourly notations are considered in the Gospel according to John, it is found that they do in fact work out well in terms of the Roman reckoning. For example, in John 1:39 a reckoning from the morning would make

¹⁶Georges Contenau, *Everyday Life in Babylon and Assyria* (London: E. Arnold, 1954), 11.

¹⁷Gow, *Companion*, 79.

¹⁸Hipparchus 2.4.5, ed. C. Manitius (Leipzig: Teubner, 1894), 184.

¹⁹*Tetrabiblos* 76, tr. F. E. Robbins (LCL, 1948), 165–167.

²⁰Russell, Dugan, and Stewart, *Astronomy* 1:78.

²¹*Athenian Constitution* 67.2, tr. H. Rackham (LCL, 1952), 187; cf. Sontheimer, PW, Zweite Reihe 4.2, cols. 2017–2018.

²²*Pesakhim* 11b–12b; Epstein, *BT* 51–56.

the “tenth hour” four o’clock in the afternoon, but a reckoning from midnight would make it ten o’clock in the morning, the later being more appropriate to the fact that the two disciples then stayed with Jesus “that day.” In John 4:6 the “sixth hour” would be midday in the one case, but six o’clock in the evening in the other, and the latter would be a very likely time for the gathering at the well. In John 4:52 the “seventh hour” would be one p.m. or seven p.m., and the latter may be more likely for the arrival at Cana from Capernaum, a journey of twenty miles.²³

20. Among the parts of the day, the “evening” was of special importance. We have already seen (§§12, 14) how the regularly used day in later Jewish times began in the evening rather than in the morning, and how either the sunset or the appearing of the stars was taken as the exact time of its beginning. The evening was also important because of the sacrifices which were made at that time, and in this connection there was a discussion of exactly what period of time was meant. According to Exod 12:6 the Passover lambs were to be killed “in the evening” of the fourteenth day of the first month, and Lev 23:5 gives the same date for “the Lord’s Passover.” In all three passages the Hebrew is literally “between the two evenings” (ASV margin), although in the first two cases the Septuagint translates simply πρὸς ἑσπέραν, “towards evening,” and only in the Leviticus passage renders ἀνὰ μέσον τῶν ἑσπερινῶν, “between the evenings.” The Mishna²⁴ states that the daily evening burnt offering was slaughtered at eight and a half hours, that is two-thirty o’clock, and offered at nine and a half hours, that is three-thirty o’clock. If it was the eve of Passover it was slaughtered at seven and a half hours, one-thirty o’clock, and offered at eight and a half hours, two-thirty o’clock, whether on a weekday or the Sabbath; if it was the eve of Passover and this fell on the eve of a Sabbath, that is on a Friday, it was slaughtered at six and a half hours, twelve-thirty o’clock, and offered at seven and a half hours, one-thirty o’clock; and then the Passover offering was slaughtered after that.

21. Explaining this procedure the accompanying Gemara²⁵ states that “between the evenings” means “from the time that the sun commences to decline in the west,” and that the “two evenings” give “two and a half hours before and two and a half hours after and one hour for preparation” of the sacrifice. This means that “evening” begins as soon as the sun passes its midday zenith, and that the “two evenings” are from twelve to two-thirty o’clock, and from three-thirty until six o’clock respectively. Thus the daily evening burnt offering is ordinarily sacrificed in the hour between these two evenings, but when the Passover must also be sacrificed the same afternoon then the daily sacrifice is moved ahead. In another passage the Mishna²⁶ deals with the requirement of Exod 34:25 that the Passover sacrifice not be offered with leaven, and states that everything leavened must be burned at the beginning of the sixth hour, that is at twelve o’clock noon. As the accompanying discussion in the

²³Norman Walker, *NovT* 4 (1960): 69–73.

²⁴*Pesakhim* 5:1, Danby 141.

²⁵*Pesakhim* 58a, Epstein, *BT* 287–288.

²⁶*Pesakhim* 1:4, Danby 137.

Gemara²⁷ shows, this indicates that the sacrificing could begin immediately after noon. According to Josephus²⁸ the Passover sacrifices were conducted from the ninth to the eleventh hour, that is from three to five o'clock in the afternoon, and this was presumably the standard practice in the first century A.D.

22. According to the foregoing passages, the “evening” was substantially equivalent to the entire afternoon. In Deut 16:6, however, it is said that the Passover sacrifice is to be offered “in the evening at the going down of the sun.” The Talmudic explanation of this was that the evening meant the afternoon and was the time when the Passover was to be slaughtered, and that the sunset was the time when it was to be eaten.²⁹ The Sadducees and the Samaritans, however, held that the slaughtering of the lamb itself was to take place between sunset and darkness.³⁰ *Jubilees* seems to agree with this when it says about the Passover lamb: “It is not permissible to slay it during the period bordering on the evening, and let them eat it at the time of the evening until the third part of the night” (49:12).³¹ *Targum Onkelos* also rendered “between the two evenings” in Exod 12:6 as “between the two suns,”³² and this was then explained as meaning the time between sunset and the coming out of the stars.³³

23. In either case, however, whether it meant the afternoon time up until sunset, or the time from sunset until the stars became visible, the “evening” in the sense and in the regard just discussed evidently belonged to the closing part of the day, and it was only with the sunset or the appearing of the stars that the next day began.

2. The Week

LITERATURE: Hildegard and Julius Lewy, “The Origin of the Week and the Oldest West Asiatic Calendar,” *HUCA* 17 (1942–43): 1–152c; Solomon Gandz, “The Origin of the Planetary Week or The Planetary Week in Hebrew Literature,” *Proceedings of the American Academy for Jewish Research* 18 (1948/49): 213–254.

24. A sequence of seven days forms a week. Since the ancient Babylonians recognized seven winds, as may be seen in the Creation Epic where Marduk “sent forth the winds he had brought forth, the seven of them,”³⁴ one theory is that originally one day was dedicated to each of the winds and thus a week of seven days was formed.³⁵ In the time of Hammurabi, however, it does

²⁷*Pesakhim* 5a, Epstein, *BT* 17.

²⁸*War* 6.423.

²⁹*Berakot* 9a, Epstein, *BT* 46–47.

³⁰Emil G. Hirsch, *JE* 9:553.

³¹*APOT* 2:80.

³²J. W. Etheridge, ed., *The Targums of Onkelos and Jonathan ben Uzziel on the Pentateuch: With the Fragments of the Jerusalem Targum from the Chaldee* (2 vols.; London : Longman, Green, Longman, and Roberts, 1862–1865), 1: 370.

³³S. R. Driver, *The Book of Exodus* (The Cambridge Bible for Schools and Colleges; Cambridge: Cambridge University Press, 1911), 89 n.

³⁴*ANET* 66.

³⁵Lewy, *HUCA* 17 (1942–43): 6–25.

not appear that this concept of the week was clearly established³⁶ and the theory is improbable.³⁷ Much more likely is the influence of the widespread attention in the ancient world not only to the sun and moon but also to the five heavenly bodies which were observed to change their places in relation to the background of the so-called fixed stars, namely Mercury, Venus, Mars, Jupiter, and Saturn. In Egyptian they were called “the stars that know no rest,” and in Greek their name was πλανητής, “a wanderer,” “a planet.” Together with the sun and moon, this made seven, and it was their number which most probably gave rise to the number of the days of the week, a supposition which is the more likely because of the names which were later quite universally given to the different days (§25).³⁸ A period of seven days a week was called שבוע (*shavua'*) in Hebrew (Gen 29:27, etc.), from *sheva'*, “seven”; and in Greek it was σάββατον (Luke 18:12, etc.). In the Bible the days of the week are simply numbered and the seventh day is also named the Sabbath (שבת, *shabbat*; σάββατον). In addition to this, the day before the Sabbath was called the day of Preparation,³⁹ and by the Christians the first day of the week was called the Lord’s day (Rev 1:10).

25. The custom of naming the seven days of the week after the planets is attested in the first century B.C., when Tibullus (d. 19 B.C.) mentions the day of Saturn, and in the first century A.D. when Greek and Latin wall inscriptions at Pompeii (A.D. 79) list “the days of the gods,” namely of Saturn, the sun, the moon, Mars, Mercury, Jupiter and Venus. This listing, with the later equivalents, is shown in Table 4.

TABLE 4. *The Planetary Names of the Days of the Week*

Θεων ημερας	Dies	The Day of	English Name
Κρονου	Saturni	Saturn	Saturday
Ηλιου	Solis	the sun	Sunday
Σεληνης	Lunae	the moon	Monday
Αρεως	Martis	Mars	Tuesday (Tiw’s day)
Ερμου	(Mercurii)	Mercury	Wednesday (Woden’s day)
Διου	Jovis	Jupiter	Thursday (Thor’s day)
[Αφρο]δειτης	Veneris	Venus	Friday (Frigg’s day) ⁴⁰

Dio Cassius (d. A.D. c. 235) says this custom of referring the days to the seven planets was instituted by the Egyptians and was in his own time found among all mankind.⁴¹ Dio’s remarks in this connection, that the Jews dedicate to their God “the day called the day of the Saturn,” is of course correct as far as Jewish observance of Saturday or the Sabbath is concerned, but they would hardly have

³⁶Mahler, *Handbuch*, 171.

³⁷De Vaux, review of the first edition of this book, *RB* 73 (1966): 146–147.

³⁸*EB* (1929) 4: 568.

³⁹παρασκευή. Josephus, *Ant.* 16.163; Matt 27:62; Luke 23:54; John 19:31, 42; προσάββατον. Mark 15:42.

⁴⁰Emil Schürer, *ZNW* 6 (1905): 25, 27.

⁴¹*Roman History* 37.17–19.

designated the day by the name which the pagan writer uses. In an apocryphal rabbinic work, however, the *Pirke de Rabbi Eliezer*, the final edition of which probably dates in the ninth century A.D., the planets which rule the week are named. For each day a pair is given, the first being the ruler of the nighttime and the second the regent of the following daytime: “The planets serve . . . as the regents of the seven days of the week, to wit: On the first day, Mercury and the Sun; on the second, Jupiter and the Moon; on the third, Venus and Mars; on the fourth, Saturn and Mercury; on the fifth, the Sun and Jupiter; on the sixth, the Moon and Venus; on the seventh, Mars and Saturn.”⁴²

3. The Month

26. Like the Sumero-Akkadian word for day, which can at most suggest a measure of association of this time period with daily land and sea breezes (§19) rather than explain the origin of the idea of the “day,” and the seven winds of the Babylonian epic of creation which, in spite of one theory, provide only an unlikely basis for the concept of the “week,” which was probably not yet formalized in the time of Hammurabi (§24), so also the Gezer Calendar in which months and agricultural tasks are set side by side (§58), and the several Old Testament month names which describe their respective periods of time in terms of agricultural and climatic conditions (§59), have been seen in some views as pointing to the original basis of the “month.” This, however, is also unlikely, for in the Gezer Calendar the primary reference is to the month and not to agriculture, and in fact the agricultural year is variable and therefore a poor basis for an exact calendar,⁴³ although the seasons are of sufficient regularity that a usable calendar needs to be kept in at least approximate harmony with them. Like the sun for the day and the planets for the week it is, therefore, another celestial object, namely, the moon, observation of which most probably led to the concept of the “month” and continued to determine the parameters of the month.

27. The etymological similarity of the words “month” and “moon” in many languages is the immediate indication of the connection between the time unit and the astronomical object. In Hebrew the word יָרַח (*yerakh*) means both “moon” and “month,” as may be seen for example in Deut 33:14 where the alternative translations are, “the precious things of the growth of the moons” (ASV), and “the rich yield of the months” (RSV). Likewise the term שָׁדֵחַ (*khodesh*), which originally meant “the shining, glittering new moon,” was later used as the designation of the festival of the day of the new moon, and also as the name of the entire month which is, as it were, the lifetime of the newly born moon. In Gen 29:14, for example, this word clearly means “month,” in 1 Sam

⁴²6.13b. *Pirke de Rabbi Eliezer (The Chapters of Rabbi Eliezer the Great) according to the Text of the Manuscript Belonging to Abraham Epstein of Vienna*, ed. Gerald Friedländer (London, 1916), 32; Solomon Gandz in *Proceedings of the American Academy for Jewish Research* 18 (1948–49): 230.

⁴³Simon J. de Vries, review of the first edition of the present book, *JBL* 84 (1965): 76–80.

20:5 and other passages it means the “new moon” day.⁴⁴ Likewise in Greek the word μήνη means “moon” and μήν means “month.” In the Septuagint μήν is the translation of both חַדָּשׁ (Deut 33:14, etc.) and חֹדֶשׁ (Gen 29:14). In the New Testament μήν regularly means “month” (Luke 1:24, etc.), but in one case (Gal 4:10) probably refers to the new moon festival.

28. Insofar as the month was related to the moon, the determination of its length depended upon observation of the phases of the moon. In Egypt, where the day probably began at dawn, it is thought that the month probably began with a lunar phenomenon which could be observed at that time of day. As the moon wanes, the old crescent is finally just visible in the eastern sky before sunrise one morning and on the next morning it is invisible. It may have been, therefore, on the morning when the old crescent could no longer be seen that the Egyptian lunar month began.⁴⁵ In Mesopotamia, on the other hand, the day began when the crescent of the new moon was first visible in the western sky at sunset.⁴⁶

29. In modern astronomy the time from one new moon to the next, which is known as the synodic or ordinary month, is determined as 29.530588 days, or 29 days, 12 hours, 44 minutes, 2.8 seconds.⁴⁷ This means that on the average the new moon will be seen approximately every 29½ days, and that the full moon will come approximately 14¾ days after the appearing of the new moon, that is on the fourteenth day of the lunar month, with the day reckoned from evening to evening.⁴⁸ After the accumulation of data by observation, the month could have been calculated in advance. Likewise it could have been established as a standard unit, say of 30 days, rather than left variable as it must be to agree with the observed phases of the moon. A problem arises when the relation of the month to the year is brought into consideration. Twelve months of 29½ days each make a year of 354 days and 12 months of 30 days each make a year of 360 days, but the year measured by the sun is in round numbers 365 days in length; thus a lunar year of 360 days is 5 days short and a lunar year of 354 days is 11 days short. These two ways of counting the days of the month are found in the existing story of the flood in Gen 6:5–8:22. In Gen 7:11 the flood began in the second month, on the 17th day of the month; in Gen 8:3–4 the waters had abated at the end of 150 days and the ark came to rest upon the 17th day of the month; the intervening time was exactly 5 months or 150 days, i.e., the months were each 30 days in length. In Gen 8:13–15 the flood waters were dried from off the earth in the first month, the first day of the month, and in the second month, on the 27th day of the month, the earth was dry and Noah went forth from the ark. Since the flood began in the second month, on the 17th day of the month (Gen 7:11), this first day of the first month was the beginning of a new year and the 16th day of the ensuing second month was the last day of the first year of

⁴⁴Solomon Gandz, *JQR* 39 (1948–49): 259–260.

⁴⁵PCAE 9–23.

⁴⁶PDBC 1.

⁴⁷*The American Ephemeris and Nautical Almanac for the Year 1958* (1956), xvi.

⁴⁸Julian Morgenstern, *HUCA* 10 (1953): 25.

the flood and the 17th day of that second month was the first day of the second year of the flood, whereby the 27th day of this same second month was the 11th day of the second year of the flood, i.e., the flood lasted for one year and 11 days, which makes exactly the 11-day difference between a lunar year of 354 days and the solar year of 365 days.⁴⁹ It is the same difference between the lunar year and the solar year that will be of much concern in respect to the Egyptian, Babylonian, and Jewish calendars.

4. The Year

30. The ordinary Hebrew word for “year” is שָׁנָה (*shannah*). It is etymologically connected with the idea of “change” or “repeated action,” and thus describes a “revolution of time.” In the Septuagint it is translated both by ἐνιαυτός (Gen 1:14, etc.), properly a “cycle of time,” and more frequently by ἔτος (Gen 5:3, etc.) and both Greek words are used for “year” in the New Testament (John 11:49, etc.; Luke 3:1, etc.).

31. Movement through the whole cycle of time was no doubt noticed from very early times because of changes in climate, in times of sowing and harvesting, and in lengths of days—all matters themselves of course dependent upon the sun—but more precise definition of a “year” waited upon more exact observation of the apparent movement of the sun. In Egypt the annual inundation of the Nile was an annually prominent reminder of the return of the cycle, and was regularly followed by the season of sowing. In Palestine the climate was marked by the “early rain” or “autumn rain” which came in Oct/Nov, and the “later rain” or “spring rain” which came in Mar/Apr (Deut 11:14; Jer 5:24),⁵⁰ as well as by the recurrence of summer and winter (Zech 14:8, etc.) and the agricultural seasons likewise returned regularly with the ripening of the olives in the fall (Sept/Oct–Oct/Nov), for example, and the shooting into ear of the barley in the spring (Mar/Apr).⁵¹

32. The autumn and spring seasons, to which attention was thus particularly drawn by climatic and agricultural events, were also marked by the equality in length of day and night which occurs everywhere when the sun crosses the equator in each season. Each such point is an equinox (equal night [and day] time) and by our reckoning the autumnal equinox falls about September 22, the vernal equinox about March 20. Likewise the summer and winter were marked respectively by the times when the sun seems to stand still in its northward movement and again in its southward movement. These points are the summer solstice and the winter solstice and come by our reckoning about June 21 and December 21. When these several points were recognized they provided definite markers in the course of the year, and it was no doubt possible to establish them even early with some precision by observation of the length of

⁴⁹Mahler, *Handbuch*, 172 and n. 1.

⁵⁰E. Hull, HDB 4: 195.

⁵¹W. F. Albright, *BASOR* 92 (Dec 1934): 22–23 n. 30 and n. 37.

day and night and by measurement of the shadow of the sun.⁵² In more precise observations embodied in his famous star catalogue (completed in 129 B.C.), the Greek astronomer Hipparchus noticed that stars had shifted in a systematic way from earlier Babylonian (Chaldean) measures. He also discovered the precession of the equinoxes, i.e., their slow westward movement due to the slow gyration of the rotation axis of the earth.

33. When such a mark as the vernal equinox is established, the length of the year from that point through a “revolution of time” and back to the same point can be measured. In Egypt, as will be noted in discussing the Egyptian calendar below, the length of the year was probably recognized as early as the third millennium B.C. as being 365 days, and with more exact measurements it was later found to be about 365¼ days. Among the Jews, Mar Samuel (A.D. c. 165–c. 250), who directed a school at Nehardea in Babylonia and was said to be as familiar with the paths of heaven as with the streets of his own city,⁵³ reckoned the year at 365 days and 6 hours, while his contemporary, Rab Adda, made it 365 days, 5 hours, 55 minutes, 25 and a fraction seconds.⁵⁴ The Julian calendar (§144) accepted the standard figure of 365¼ days with which we are familiar, but was therewith about eleven minutes longer than the astronomical year. In modern astronomy the length of the ordinary, tropical (the year of the seasons, from *tropicus*, “belonging to a turn, turning”), or solar year, as it is called, is given as 365.24219879 days, or 365 days, 5 hours, 48 minutes, 45.975 seconds.⁵⁵

34. When the four points of the vernal and autumnal equinoxes and the summer and winter solstices are taken, the year is readily divisible into four parts. Such a division of the solar year is found in the Talmud,⁵⁶ where the word תקופה (*tequfah*) is used as the name of each of the four periods. The word means “cycle” or “season,” and a related form is found as “circuit” in the Manual of Discipline (§82).

35. In the course of the year the sun also seems to trace a path eastward against the background of the stars. This path is known as the zodiac. In a month the sun travels approximately one-twelfth of the way around this circle, and perhaps for this reason, the zodiac was divided into twelve positions.⁵⁷ Using the sexagesimal system of ancient Mesopotamia, the entire circle of the zodiac comprises 360 degrees, each of the twelve sections, 30 degrees. These divisions of the zodiac are designated according to the constellations of stars which they contain. Already in the Babylonian Creation Epic we read of the work of Marduk:

⁵²Russell, Dugan, and Stewart, *Astronomy* 1:151; E. C. Krupp, ed., *In Search of Ancient Astronomies* (Garden City, N.Y.: Doubleday, 1978), 7.

⁵³*Berakot* 58b; Epstein, *BT* 365.

⁵⁴*JE* 3: 500.

⁵⁵*American Ephemeris for Year 1958*, xvi.

⁵⁶*Sanhedrin* 11b, Goldschmidt, *BT* 7: 36–37.

⁵⁷F. Von Oefe, Hastings, *ERE* 12: 51.

He constructed stations for the great gods,
 Fixing their astral likenesses as constellations.
 He determined the year by designating the zones:
 He set up three constellations for each of the twelve months.⁵⁸

36. Later a single constellation was taken as the sign of each of the twelve parts of the zodiac. In the tractate *Berakot*⁵⁹ of the Talmud, the “Sovereign of the Universe” says: “Twelve constellations have I created in the firmament, and for each constellation I have created thirty hosts, and for each host I have created thirty legions, and for each legion I have created thirty cohorts, and for each cohort I have created thirty maniples,⁶⁰ and for each maniple I have created thirty camps, and to each camp I have attached three hundred sixty-five thousands of myriads of stars, corresponding to the days of the solar year.” In the *Sefer Yesirah*, a Jewish work of unknown antiquity, the names of the constellations are given as follows:⁶¹ Taleh, Shor, Te’omin, Sartan, Aryeh, Betulah, Moznayim, ’Aqrab, Qeshet, Gedi, Deli, and Dagim. The Greek names as found in Hipparchus, were as follows, the Latin forms and the meanings also being given: (1) ὁ Κριός, Aries, the Ram; (2) ὁ Ταῦρος, Taurus, the Bull; (3) οἱ Δίδυμοι, Gemini, the Twins; (4) ὁ καρκίνος, Cancer, the Crab; (5) ὁ Λέων, Leo, the Lion; (6) ἡ Παρθένος, Virgo, the Virgin; (7) αἱ Χηλαί, Libra, the Balance; (8) ὁ Σκορπίος, Scorpio, the Scorpion; (9) ὁ Τοξότης, Sagittarius, the Archer; (10) ὁ Ἀιγόκερως, Capricornus, the Goat; (11) ὁ Ὑδροχόος, Aquarius, the Water Carrier; (12) οἱ Ἰχθύες, Pisces, the Fishes. Since most of these were animals, from the word ζῴδιον, “a little animal,” the entire zone was called ὁ ζωδιακὸς κύκλος,⁶² the zodiacal circle, or zodiac.

B. CALENDARS

1. The Egyptian Calendar

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⁵⁸ANET 67.

⁵⁹32b; Epstein, *BT* 201.

⁶⁰Like the other terms, a subdivision of the Roman military organization.

⁶¹*JE* 12: 688.

⁶²Hipparchus 1.6.4, ed. Manitius, 56.