Hebrew numerals

The system of **Hebrew numerals** is a quasi-decimal alphabetic numeral system using the letters of the Hebrew alphabet. The system was adapted from that of the Greek numerals in the late 2nd century BC.

The current numeral system is also known as the *Hebrew alphabetic numerals* to contrast with earlier systems of writing numerals used in classical antiquity. These systems were inherited from usage in the Aramaic and Phoenician scripts, attested from c. 800 BC in the so-called Samaria ostraca and sometimes known as *Hebrew-Aramaic numerals*, ultimately derived from the Egyptian Hieratic numerals.

The Greek system was adopted in Hellenistic Judaism and had been in use in Greece since about the 5th century BC.[1]

In this system, there is no notation for zero, and the numeric values for individual letters are added together. Each unit (1, 2, ..., 9) is assigned a separate letter, each tens (10, 20, ..., 90) a separate letter, and the first four hundreds (100, 200, 300, 400) a separate letter. The later hundreds (500, 600, 700, 800 and 900) are represented by the sum of two or three letters representing the first four hundreds. To represent numbers from 1,000 to 999,999, the same letters are reused to serve as thousands, tens of thousands, and hundreds of thousands. Gematria (Jewish numerology) uses these transformations extensively

In Israel today, the decimal system of Arabic numerals (ex. 0, 1, 2, 3, etc.) is used in almost all cases (money, age, date on the civil calendar). The Hebrew numerals are used only in special cases, such as when using the Hebrew calendar, or numbering a list (similar to a, b, c, d, etc.), much as Roman numerals are used in the West.

Contents

Numbers

The Hebrew language has names for common numbers that range from zero to one million. Letters of the Hebrew alphabet are used to represent numbers in a few traditional contexts, for example in calendars. In other situations Arabic numerals are used. Cardinal and ordinal numbers must agree in gender with the noun they are describing. If there is no such noun (e.g. telephone numbers), the

feminine form is used. For ordinal numbers greater than ten the cardinal is used and numbers above the value 20 have no gender

Ordinal values

Ordinal (English)	Ordinal (Hebrew)	
	Masculine	Feminine
First	רִאשׁוֹן (rishon)	רִאשׁוֹנָה (rishona)
Second	שֵׁנִי (sheni)	שְׁנִיָּה (shniya)
Third	שְׁלִישִׁי (shlishi)	שְׁלִישִׁית (shlishit)
Fourth	רְבִיעִי (revi'i)	רְבִיעִית (revi'it)
Fifth	חֲמִישִׁי (chamishi)	חֲמִישִׁית (chamishit)
Sixth	שִׁשִּׁי (shishi)	שִׁשִּׁית (shishit)
Seventh	שְׁבִיעִי (shvi'i)	שְׁבִיעִית (shvi'it)
Eighth	שְׁמִינִי (shmini)	שְׁמִינִית (shminit)
Ninth	תְּשִׁיעִי (tshi'i)	תְּשִׁיעִית (tshi'it)
Tenth	עֲשִׂירִי ('asiri)	עֲשִׂירִית ('asirit)

Note: For ordinal numbers greater than 10, cardinal numbers are used instead.

The lower clock on theJewish Town Hall building in Prague, with Hebrew numerals in counterclockwise order

Early 20th century pocket watches with Hebrew numerals in clockwise order (Jewish Museum, Berlin).

Cardinal Values

Arabic numerals	Hebrew numerals	Cardinal (ex. one, two, three)	
		Masculine	Feminine
0	-	אֶפֶס (efes)	
1	א	אֶחָד (echad)	אַחַת (achat)
2	ב	שְׁנַיִם (shnayim)	שְׁתַּיִם (shtayim)
3	ג	שְׁלֹשָׁה (shlosha)	שָׁלֹשׁ (shalosh)
4	ד	אַרְבָּעָה (arba'a)	אַרְבַּע (arba')
5	ה	חֲמִשָּׁה (chamisha)	חָמֵשׁ (chamesh)
6	ו	שִׁשָּׁה (shisha)	שֵׁשׁ (shesh)
7	ז	שִׁבְעָה (shiv'a)	שֶׁבַע (sheva')
8	ח	שְׁמוֹנָה (shmona)	שְׁמוֹנֶה (shmone)
9	ט	תִּשְׁעָה (tish'a)	תֵּשַׁע (tesha')
10	י	עֲשָׂרָה ('assara)	עֶשֶׂר ('eser)
11	יא	אַחַד-עָשָׂר (achad-'asar)	אַחַת-עֶשְׂרֵה (achat-'esre)
12	יב	שְׁנֵים-עָשָׂר (shneyim-'asar)	שְׁתֵּים-עֶשְׂרֵה (shteyim-'esre)
13	יג	שְׁלֹשָׁה-עָשָׂר (shlosha-'asar)	שְׁלֹשׁ-עֶשְׂרֵה (shlosh-'esre)
14	יד	אַרְבָּעָה-עָשָׂר (arba'a-'asar)	אַרְבַּע-עֶשְׂרֵה (arba'-'esre)
15	ט״ו	חֲמִשָּׁה-עָשָׂר (chamisha-'asar)	חָמֵשׁ-עֶשְׂרֵה (chamesh-'esre)
16	ט״ז	שִׁשָּׁה-עָשָׂר (shisha-'asar)	שֵׁשׁ-עֶשְׂרֵה (shesh-'esre)
17	יז	שִׁבְעָה-עָשָׂר (shiv'a-'asar)	שְׁבַע-עֶשְׂרֵה (shva'-'esre)
18	יח	שְׁמוֹנָה-עָשָׂר (shmona-'asar)	שְׁמוֹנֶה-עֶשְׂרֵה (shmone-'esre)
19	יט	תִּשְׁעָה-עָשָׂר (tish'a-'asar)	תְּשַׁע-עֶשְׂרֵה (tesha'-'esre)
20	כ or ך	עֶשְׂרִים ('esrim)	
30	ל	שְׁלֹשִׁים (shloshim)	
40	מ or ם	אַרְבָּעִים (arba'im)	
50	נ or ן	חֲמִשִּׁים (chamishim)	
60	ס	שִׁשִּׁים (shishim)	
70	ע	שִׁבְעִים (shiv'im)	
80	פ or ף	שְׁמוֹנִים (shmonim)	
90	צ or ץ	תִּשְׁעִים (tish'im)	
100	ק	מֵאָה (mea)	
200	ר	מָאתַיִם (matayim)	

300	ש	שְׁלֹש מֵאוֹת (shlosh meot)
400	ת	אַרְבַּע מֵאוֹת (arba' meot)
500	ך	חֲמֵשׁ מֵאוֹת (chamesh meot)
600	ם	שֵׁשׁ מֵאוֹת (shesh meot)
700	ן	שְׁבַע מֵאוֹת (shva meot)
800	ף	שְׁמוֹנָה מֵאוֹת (shmone meot)
900	ץ	תְּשַׁע מַאוֹת (tsha' meot)
1000	א׳	אֶלֶף (elef)
2000	ב׳	אַלְפַּיִם (alpaim)
5000	ה׳	חֲמֵשֶׁת אֲלָפִים (chameshet alafim)
10 000	א״י	עֲשֶׂרֶת אֲלָפִים (aseret alafim)
100 000	א״ק	מֵאָה אֶלֶף (mea elef)
1 000 000	א״א׳	מִילְיוֹן (miliyon)
1 000 000 000	א״א״א׳	מִילְיַרְד (miliyard)
1 000 000 000 000	א״א״א״א׳	טְרִילְיוֹן (trilyon)
10^{15}	א״א״א״א״א׳	קְוַדְרִילְיוֹן (kwadrilyon)
10^{18}	א״א״א״א״א״א׳	קְוִינְטִילְיוֹן (kwintilyon)

Note: For numbers greater than 20, gender does not apply. Officially, numbers greater than million were represented by the long scale; However, since January 21st, 2013, the modified short scale (under which the long scale milliard is substituted for the strict short scale billion), which was already the colloquial standard, became official.[2]

Speaking and writing

Cardinal and ordinal numbers must agree in gender (masculine or feminine; mixed groups are treated as masculine) with the noun they are describing. If there is no such noun (e.g. a telephone number or a house number in a street address), the feminine form is used. Ordinal numbers must also agree in number and definite status like other adjectives. The cardinal number precedes the noun (e.g., *shlosha yeladim*), except for the number one which succeeds it (e.g.*yeled echad*). The number two is special:*shnayim* (m.) and *shtayim* (f.) become *shney* (m.) and *shtey* (f.) when followed by the noun they count. For ordinal numbers (numbers indicating position) greater than ten the cardinal is used.

Calculations

The Hebrew numeric system operates on the additive principle in which the numeric values of the letters are added together to form the total. For example, 177 is represented as קעז which (from right to left) corresponds to 100 + 70 + 7 = 177.

Mathematically, this type of system requires 27 letters (1-9, 10-90, 100-900). In practice the last letter, *tav* (which has the value 400) is used in combination with itself and/or other letters from *kof* (100) onwards, to generate numbers from 500 and above. Alternatively, the 22-letter Hebrew numeral set is sometimes extended to 27 by using 5 *sofit* (final) forms of the Hebrew letters.[3]

Key exceptions

By convention, the numbers 15 and 16 are represented as ט״ו (9 + 6) and ט״ז (9 + 7), respectively, in order to refrain from using the two-letter combinations י-ה (10 + 5) and י-ו (10 + 6), which are alternate written forms for the Name of God in everyday writing. In the calendar, this manifests every full moon, since all Hebrew months start on a new moon (see for example: Tu BiShvat).

Combinations which would spell out words with negative connotations are sometimes avoided by switching the order of the letters. For instance, 744 which should be written as תשמ״ד (meaning "you/it will be destroyed") might instead be written as תשד״מ or תמש״ד (meaning "end to demon").

Use of final letters

The Hebrew numeral system has sometimes been extended to include the five final letter forms—ך (500), ם (600), ן (700), ף (800), ץ (900)—which are then used to indicate the numbers from 500 to 900.

The ordinary forms for 500 to 900 are—(900) תתק״, (800) ת״ת, (700) ת״ש, (600) ת״ר, (500) ת״ק

Gershayim

Gershayim (U+05F4 in Unicode, and resembling a double quote mark) (sometimes erroneously referred to as *merkha'ot*, which is Hebrew for double quote) are inserted before (to the right of) the last (leftmost) letter to indicate that the sequence of letters represents a number rather than a word. This is used in the case where a number is represented by two or more Hebrew numerals (*e.g.*, 28 → כ״ח).

Similarly, a single Geresh (U+05F3 in Unicode, and resembling a single quote mark) is appended after (to the left of) a single letter to indicate that the letter represents a number rather than a (one-letter) word. This is used in the case where a number is represented by a single Hebrew numeral (*e.g.*, 100 → ק׳).

Note that Geresh and Gershayim merely indicate "*not a (normal) word*." Context usually determines whether they indicate a number or something else (such as "*abbreviation*").

An alternative method found in old manuscripts and still found on modern-day tombstones is to put a dot above each letter of the number

A tombstone from 1935 in Baiersdorf, Germany, reading:

נפטר ביום כ֗ אייר
ונקבר ביום כ֗ג֗ אייר
שנת ת֗ר֗צ֗ה֗ לפ֗ק

In English:

*Passed away on day **20** Iyar*
*And buried on day **23** Iyar*
*Year **695** without the thousands [i.e. year 5695]*

Note the dots above each letter in each number

Decimals

In print, Arabic numerals are employed in Modern Hebrew for most purposes. Hebrew numerals are used nowadays primarily for writing the days and years of the Hebrew calendar; for references to traditional Jewish texts (particularly for Biblical chapter and verse and for Talmudic folios); for bulleted or numbered lists (similar to *A*, *B*, *C*, *etc.*, in English); and in numerology (gematria).

Thousands and date formats

Thousands are counted separately, and the thousands count precedes the rest of the number (to the *right*, since Hebrew is read from right to left). There are no special marks to signify that the "count" is starting over with thousands, which can theoretically lead to ambiguity, although a single quote mark is sometimes used after the letter. When specifying years of the

Hebrew calendar in the present millennium, writers usually omit the thousands (which is presently 5 [ה]), but if they do not this is accepted to mean 5 * 1000, with no ambiguityThe current Israeli coinage includes the thousands.

Date examples

“Monday, 15 Adar 5764” (where 5764 = 5(×1000) + 400 + 300 + 60 + 4, and 15 = 9 + 6):

> In full (with thousands): “Monday, 15(th) of Adar, 5764”
> יום שני ט״ו באדר ה׳תשס״ד
>
> Common usage (omitting thousands): “Monday, 15(th) of Adar, (5)764”
> יום שני ט״ו באדר תשס״ד

“Thursday, 3 Nisan 5767” (where 5767 = 5(×1000) + 400 + 300 + 60 + 7):

> In full (with thousands): “Thursday, 3(rd) of Nisan, 5767”
> יום חמישי ג׳ בניסן ה׳תשס״ז
>
> Common usage (omitting thousands): “Thursday, 3(rd) of Nisan, (5)767”
> יום חמישי ג׳ בניסן תשס״ז

To see how *today's* date in the Hebrew calendar is written, see, for example,Hebcal date converter.

Recent years

5780 (2019–20) = תש״פ

5779 (2018–19) = תשע״ט

...

5772 (2011–12) = תשע״ב

5771 (2010–11) = תשע״א

5770 (2009–10) = תש״ע

5769 (2008–09) = תשס״ט

...

5761 (2000–01) = תשס״א

5760 (1999–00) = תש״ס

Similar systems

The Abjad numerals are equivalent to the Hebrew numerals up to 400. The Greek numerals differ from the Hebrew ones from 90 upwards because in theGreek alphabet there is no equivalent for*Tsadi* (צ).

See also

- Bible code, a purported set of secret messages encoded within the Torah.
- Biblical and Talmudic units of measurement
- Chol HaMoed, the intermediate days during Passover and Sukkot.
- Chronology of the Bible

- Counting of the Omer
- Gematria, Jewish system of assigning numerical value to a word or phrase.
- Hebrew calendar
- Jewish and Israeli holidays 2000–2050
- Lag BaOmer, 33rd day of counting the *Omer*.
- Notarikon, a method of deriving a word by using each of its initial letters.
- Sephirot, the 10 attributes/emanations found in Kabbalah.
- Significance of numbers in Judaism
- Weekly Torah portion, division of the Torah into 54 portions.
- Base 32, a system that can be written with both all Arabic numerals and all Hebrew letters, much as hoBase 36 is written with all Arabic numerals and roman letters.

References

1. Stephen Chrisomalis, *Numerical Notation: A Comparative History* Cambridge University Press, 2010, p. 157 (https://books.google.ch/books?id=ux--OWgWvBQC&pg=PA157#v=onepage&q&f=false) Solomon Gandz, *Hebrew Numerals*, Proceedings of the American Academy for Jewish Research Vol. 4, (1932 - 1933), pp. 53-112.
2. http://www.hebrew-academy.org.il/2013/02/07/32-האקדמיה-ללשון-העברית-התכנסה-לישיבתה-ה/ (http://www.hebrew-academy.org.il/2013/02/07/32-האקדמיה-ללשון-העברית-התכנסה-לישיבתה-ה/)
3. According to Gandz (p. 96), cited above, this use of the sofit letters was not widely accepted and soon abandoned.

External links

- Gesenius' Hebrew Grammar, §97, §98, §134
- Gematria Chart on innerorg
- Hebrew Number Chart 1 to 1 Million with English Transliteration