L2/24-

Twelve cuneiform *tenû* numerals

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Contents

1 Summary

This document proposes filling the Cuneiform Numbers and Punctuation block with twelve cuneiform numerals used in the third millennium. Three of those

are additional numerals in the AŠ (or DIŠ) *tenû* series, 7𒀹[1]–9𒀹, where 1𒀹 = 𒀹 through 6𒀹 = 𒑎 are already encoded. Their glyphic range and usage are discussed in §3. The other proposed characters constitute a new series of numerals, formed by 𒀹 numerals crossing an 𒀸 wedge. They are discussed in §4.

These characters are extensively used in Early Dynastic administrative corpus, which is published online[2] using Unicode cuneiform as part of the [ePSD2] project. They are also used in publications discussing third millennium administrative texts. Their absence from the Standard can be explained by the initial scope going back only to the Ur III period, and by the explicit exclusion of numbers from the scope of the Early Dynastic extension; see [L2/12-208; L2/24-210R, p. 19 sq. n. 17].

2 Proposed changes to the Standard

2.1 Core specification text

No change is needed in the core specification.

2.2 Code charts

The code charts for the affected block, including the character names list with proposed informative aliases, cross references, and informative notes, are shown on the following pages. The chart incorporates the annotations proposed in [L2/24-239], as amended by the names list editor. A plain text file containing the NamesList.txt lines is attached to this document.

[1] We follow [Gor23; Gor24] and use unit numerals rather than sign names in transliterations to indicate the type of numeral. Contrary to Gori, we write the multiplicity of the sign rather than its value, as in ATF; thus 3𒌋 for both 3(bur$_3$) and 3(u), rather than 30𒌋 for the latter.

[2] See, *e.g.*, the transcription of [P220703] in https://build-oracc.museum.upenn.edu/epsd2/P220703/cuneify. Note that as of this writing, that page uses the private use area for the characters proposed in this document, and uses provisionally assigned code points for the characters proposed in [L2/24-210R], neither of which are portable—web fonts are used for both—*cf.* https://build-oracc.museum.upenn.edu/epsd2/P131747/cuneify for the Ur III [P131747], which only uses assigned code points.

	1240	1241	1242	1243	1244	1245	1246	1247
0	12400	12410	12420	12430	12440	12450	12460	12470
1	12401	12411	12421	12431	12441	12451	12461	12471
2	12402	12412	12422	12432	12442	12452	12462	12472
3	12403	12413	12423	12433	12443	12453	12463	12473
4	12404	12414	12424	12434	12444	12454	12464	12474
5	12405	12415	12425	12435	12445	12455	12465	12475
6	12406	12416	12426	12436	12446	12456	12466	12476
7	12407	12417	12427	12437	12447	12457	12467	12477
8	12408	12418	12428	12438	12448	12458	12468	12478
9	12409	12419	12429	12439	12449	12459	12469	12479
A	1240A	1241A	1242A	1243A	1244A	1245A	1246A	1247A
B	1240B	1241B	1242B	1243B	1244B	1245B	1246B	1247B
C	1240C	1241C	1242C	1243C	1244C	1245C	1246C	1247C
D	1240D	1241D	1242D	1243D	1244D	1245D	1246D	1247D
E	1240E	1241E	1242E	1243E	1244E	1245E	1246E	1247E
F	1240F	1241F	1242F	1243F	1244F	1245F	1246F	1247F

Common numeric signs

These are used in multiple metrological systems.

12400 𒐀 CUNEIFORM NUMERIC SIGN TWO ASH
= 2 iku
→ 12038 𒀸 cuneiform sign ash
→ 12551 𒕑 cuneiform numeric sign two n01
→ 1264D 𒙍 cuneiform numeric sign two n01 flat

12401 𒐁 CUNEIFORM NUMERIC SIGN THREE ASH
12402 𒐂 CUNEIFORM NUMERIC SIGN FOUR ASH
12403 𒐃 CUNEIFORM NUMERIC SIGN FIVE ASH
12404 𒐄 CUNEIFORM NUMERIC SIGN SIX ASH
12405 𒐅 CUNEIFORM NUMERIC SIGN SEVEN ASH
12406 𒐆 CUNEIFORM NUMERIC SIGN EIGHT ASH
12407 𒐇 CUNEIFORM NUMERIC SIGN NINE ASH
12408 𒐈 CUNEIFORM NUMERIC SIGN THREE DISH
→ 12079 𒁹 cuneiform sign dish
→ 1222B 𒈫 cuneiform sign min
→ 12559 𒕙 cuneiform numeric sign three n08

12409 𒐉 CUNEIFORM NUMERIC SIGN FOUR DISH
= 4 bariga
1240A 𒐊 CUNEIFORM NUMERIC SIGN FIVE DISH
1240B 𒐋 CUNEIFORM NUMERIC SIGN SIX DISH
1240C 𒐌 CUNEIFORM NUMERIC SIGN SEVEN DISH
1240D 𒐍 CUNEIFORM NUMERIC SIGN EIGHT DISH
1240E 𒐎 CUNEIFORM NUMERIC SIGN NINE DISH
1240F 𒐏 CUNEIFORM NUMERIC SIGN FOUR U
= 4 bur_3
→ 1230B 𒌋 cuneiform sign u
→ 12399 𒎙 cuneiform sign u u
→ 1230D 𒌍 cuneiform sign u u u
→ 12565 𒕥 cuneiform numeric sign four n14
→ 12659 𒙙 cuneiform numeric sign four n14 flat

12410 𒐐 CUNEIFORM NUMERIC SIGN FIVE U
12411 𒐑 CUNEIFORM NUMERIC SIGN SIX U
12412 𒐒 CUNEIFORM NUMERIC SIGN SEVEN U
12413 𒐓 CUNEIFORM NUMERIC SIGN EIGHT U
12414 𒐔 CUNEIFORM NUMERIC SIGN NINE U
12415 𒐕 CUNEIFORM NUMERIC SIGN ONE GESH2
→ 1256B 𒕫 cuneiform numeric sign one n34

12416 𒐖 CUNEIFORM NUMERIC SIGN TWO GESH2
12417 𒐗 CUNEIFORM NUMERIC SIGN THREE GESH2
12418 𒐘 CUNEIFORM NUMERIC SIGN FOUR GESH2
12419 𒐙 CUNEIFORM NUMERIC SIGN FIVE GESH2
1241A 𒐚 CUNEIFORM NUMERIC SIGN SIX GESH2
1241B 𒐛 CUNEIFORM NUMERIC SIGN SEVEN GESH2
1241C 𒐜 CUNEIFORM NUMERIC SIGN EIGHT GESH2
1241D 𒐝 CUNEIFORM NUMERIC SIGN NINE GESH2
1241E 𒐞 CUNEIFORM NUMERIC SIGN ONE GESHU
→ 12574 𒕴 cuneiform numeric sign one n48

1241F 𒐟 CUNEIFORM NUMERIC SIGN TWO GESHU
12420 𒐠 CUNEIFORM NUMERIC SIGN THREE GESHU
12421 𒐡 CUNEIFORM NUMERIC SIGN FOUR GESHU
12422 𒐢 CUNEIFORM NUMERIC SIGN FIVE GESHU
12423 𒐣 CUNEIFORM NUMERIC SIGN TWO SHAR2
→ 122B9 𒊹 cuneiform sign shar2
→ 12579 𒕹 cuneiform numeric sign two n45

12424 𒐤 CUNEIFORM NUMERIC SIGN THREE SHAR2
12425 𒐥 CUNEIFORM NUMERIC SIGN THREE SHAR2 VARIANT FORM
12426 𒐦 CUNEIFORM NUMERIC SIGN FOUR SHAR2
12427 𒐧 CUNEIFORM NUMERIC SIGN FIVE SHAR2
12428 𒐨 CUNEIFORM NUMERIC SIGN SIX SHAR2
12429 𒐩 CUNEIFORM NUMERIC SIGN SEVEN SHAR2
1242A 𒐪 CUNEIFORM NUMERIC SIGN EIGHT SHAR2
1242B 𒐫 CUNEIFORM NUMERIC SIGN NINE SHAR2
1242C 𒐬 CUNEIFORM NUMERIC SIGN ONE SHARU
→ 12582 𒖂 cuneiform numeric sign one n50

1242D 𒐭 CUNEIFORM NUMERIC SIGN TWO SHARU
1242E 𒐮 CUNEIFORM NUMERIC SIGN THREE SHARU
1242F 𒐯 CUNEIFORM NUMERIC SIGN THREE SHARU VARIANT FORM
12430 𒐰 CUNEIFORM NUMERIC SIGN FOUR SHARU
12431 𒐱 CUNEIFORM NUMERIC SIGN FIVE SHARU
12432 𒐲 CUNEIFORM NUMERIC SIGN SHAR2 TIMES GAL PLUS DISH
12433 𒐳 CUNEIFORM NUMERIC SIGN SHAR2 TIMES GAL PLUS MIN

Area measures

12434 𒐴 CUNEIFORM NUMERIC SIGN ONE BURU
→ 1258E 𒖎 cuneiform numeric sign one buru curved
→ 12582 𒖂 cuneiform numeric sign one n50

12435 𒐵 CUNEIFORM NUMERIC SIGN TWO BURU
12436 𒐶 CUNEIFORM NUMERIC SIGN THREE BURU
12437 𒐷 CUNEIFORM NUMERIC SIGN THREE BURU VARIANT FORM
12438 𒐸 CUNEIFORM NUMERIC SIGN FOUR BURU
12439 𒐹 CUNEIFORM NUMERIC SIGN FIVE BURU

Variant stacking patterns

1243A 𒐺 CUNEIFORM NUMERIC SIGN THREE VARIANT FORM ESH16
1243B 𒐻 CUNEIFORM NUMERIC SIGN THREE VARIANT FORM ESH21
1243C 𒐼 CUNEIFORM NUMERIC SIGN FOUR VARIANT FORM LIMMU
1243D 𒐽 CUNEIFORM NUMERIC SIGN FOUR VARIANT FORM LIMMU4
1243E 𒐾 CUNEIFORM NUMERIC SIGN FOUR VARIANT FORM LIMMU A
1243F 𒐿 CUNEIFORM NUMERIC SIGN FOUR VARIANT FORM LIMMU B
12440 𒑀 CUNEIFORM NUMERIC SIGN SIX VARIANT FORM ASH9
12441 𒑁 CUNEIFORM NUMERIC SIGN SEVEN VARIANT FORM IMIN3
12442 𒑂 CUNEIFORM NUMERIC SIGN SEVEN VARIANT FORM IMIN A
12443 𒑃 CUNEIFORM NUMERIC SIGN SEVEN VARIANT FORM IMIN B
12444 𒑄 CUNEIFORM NUMERIC SIGN EIGHT VARIANT FORM USSU
12445 𒑅 CUNEIFORM NUMERIC SIGN EIGHT VARIANT FORM USSU3
12446 𒑆 CUNEIFORM NUMERIC SIGN NINE VARIANT FORM ILIMMU
12447 𒑇 CUNEIFORM NUMERIC SIGN NINE VARIANT FORM ILIMMU3
12448 𒑈 CUNEIFORM NUMERIC SIGN NINE VARIANT FORM ILIMMU4
12449 𒑉 CUNEIFORM NUMERIC SIGN NINE VARIANT FORM ILIMMU A

Slanted numerals

These are used in multiple Early Dynastic metrological systems, as well as Ur III dates and subtractive notations.

1244A 𒑊 CUNEIFORM NUMERIC SIGN TWO ASH TENU
= 2 diš tenû
→ 12039 𒀹 cuneiform sign ash zida tenu

1244B CUNEIFORM NUMERIC SIGN THREE ASH TENU
1244C CUNEIFORM NUMERIC SIGN FOUR ASH TENU
1244D CUNEIFORM NUMERIC SIGN FIVE ASH TENU
1244E CUNEIFORM NUMERIC SIGN SIX ASH TENU

Capacity measures

1244F CUNEIFORM NUMERIC SIGN ONE BAN2
• 12226 should be used for 1/2 diš
→ 12226 cuneiform sign mash
→ 12593 cuneiform numeric sign one ban2 curved

12450 CUNEIFORM NUMERIC SIGN TWO BAN2
12451 CUNEIFORM NUMERIC SIGN THREE BAN2
12452 CUNEIFORM NUMERIC SIGN FOUR BAN2
12453 CUNEIFORM NUMERIC SIGN FOUR BAN2 VARIANT FORM
12454 CUNEIFORM NUMERIC SIGN FIVE BAN2
12455 CUNEIFORM NUMERIC SIGN FIVE BAN2 VARIANT FORM
12456 CUNEIFORM NUMERIC SIGN NIGIDAMIN
= 2 bariga
→ 12079 cuneiform sign dish
→ 1255A cuneiform numeric sign two n08

12457 CUNEIFORM NUMERIC SIGN NIGIDAESH
= 3 bariga

Area measures

12458 CUNEIFORM NUMERIC SIGN ONE ESHE3
→ 1258C cuneiform numeric sign one n22

12459 CUNEIFORM NUMERIC SIGN TWO ESHE3

Fractions

1245A CUNEIFORM NUMERIC SIGN ONE THIRD DISH
1245B CUNEIFORM NUMERIC SIGN TWO THIRDS DISH
1245C CUNEIFORM NUMERIC SIGN FIVE SIXTHS DISH
1245D CUNEIFORM NUMERIC SIGN ONE THIRD VARIANT FORM A
= 1/3 aš curved
= 1/3 diš curved
→ 12598 cuneiform numeric sign ninda2 times she plus one ash curved
1245E CUNEIFORM NUMERIC SIGN TWO THIRDS VARIANT FORM A
= 2/3 aš curved
= 2/3 diš curved
→ 12599 cuneiform numeric sign ninda2 times she plus two ash curved
1245F CUNEIFORM NUMERIC SIGN ONE EIGHTH ASH
= 1/8 iku
→ 12587 cuneiform numeric sign one eighth iku curved
→ 12588 cuneiform numeric sign one eighth iku curved variant form
12460 CUNEIFORM NUMERIC SIGN ONE QUARTER ASH
= 1/4 iku
→ 12589 cuneiform numeric sign one n01 reversed
→ 1258A cuneiform numeric sign one quarter iku curved variant form
12461 CUNEIFORM NUMERIC SIGN OLD ASSYRIAN ONE SIXTH
12462 CUNEIFORM NUMERIC SIGN OLD ASSYRIAN ONE QUARTER

Capacity measures

These are used in Umma in the Ur III period with a gur of 4 bariga.

12463 CUNEIFORM NUMERIC SIGN ONE QUARTER GUR
= 1 bariga variant form
12464 CUNEIFORM NUMERIC SIGN ONE HALF GUR
= 2 bariga variant form
• The sequence 12464 12463 is used for 3/4 gur

Elamite fractions

12465 CUNEIFORM NUMERIC SIGN ELAMITE ONE THIRD
12466 CUNEIFORM NUMERIC SIGN ELAMITE TWO THIRDS

Elamite numeric signs

12467 CUNEIFORM NUMERIC SIGN ELAMITE FORTY
12468 CUNEIFORM NUMERIC SIGN ELAMITE FIFTY

Variant stacking patterns

12469 CUNEIFORM NUMERIC SIGN FOUR U VARIANT FORM
1246A CUNEIFORM NUMERIC SIGN FIVE U VARIANT FORM
1246B CUNEIFORM NUMERIC SIGN SIX U VARIANT FORM
1246C CUNEIFORM NUMERIC SIGN SEVEN U VARIANT FORM
1246D CUNEIFORM NUMERIC SIGN EIGHT U VARIANT FORM
1246E CUNEIFORM NUMERIC SIGN NINE U VARIANT FORM

Slanted numeral

1246F CUNEIFORM NUMERIC SIGN SEVEN ASH TENU

Punctuation

12470 CUNEIFORM PUNCTUATION SIGN OLD ASSYRIAN WORD DIVIDER
→ 1039F ugaritic word divider
→ 103D0 old persian word divider
12471 CUNEIFORM PUNCTUATION SIGN VERTICAL COLON
12472 CUNEIFORM PUNCTUATION SIGN DIAGONAL COLON
12473 CUNEIFORM PUNCTUATION SIGN DIAGONAL TRICOLON
12474 CUNEIFORM PUNCTUATION SIGN DIAGONAL QUADCOLON

Slanted numerals

12475 CUNEIFORM NUMERIC SIGN EIGHT ASH TENU
12476 CUNEIFORM NUMERIC SIGN NINE ASH TENU

Numerals for Early Dynastic regnal years

These are used in regnal years of the rulers of the first dynasty of Lagaš.

12477 CUNEIFORM NUMERIC SIGN ASH TIMES ONE DISH TENU
12478 CUNEIFORM NUMERIC SIGN ASH TIMES TWO DISH TENU
12479 CUNEIFORM NUMERIC SIGN ASH TIMES THREE DISH TENU
1247A CUNEIFORM NUMERIC SIGN ASH TIMES FOUR DISH TENU
1247B CUNEIFORM NUMERIC SIGN ASH TIMES FIVE DISH TENU
1247C CUNEIFORM NUMERIC SIGN ASH TIMES SIX DISH TENU
1247D CUNEIFORM NUMERIC SIGN ASH TIMES SEVEN DISH TENU
1247E CUNEIFORM NUMERIC SIGN ASH TIMES EIGHT DISH TENU
1247F CUNEIFORM NUMERIC SIGN ASH TIMES NINE DISH TENU

2.3 Properties

Add to the respective UCD files the lines given in this section. These are available as plain text files attached to this document. Changes to derived files are not listed.

2.3.1 Name, General_Category, Numeric_Value, etc.

Attached: UnicodeData.txt.

```
1246F;CUNEIFORM NUMERIC SIGN SEVEN ASH TENU;Nl;0;L;;;;7;N;;;;;
12475;CUNEIFORM NUMERIC SIGN EIGHT ASH TENU;Nl;0;L;;;;8;N;;;;;
12476;CUNEIFORM NUMERIC SIGN NINE ASH TENU;Nl;0;L;;;;9;N;;;;;
12477;CUNEIFORM NUMERIC SIGN ASH TIMES ONE DISH TENU;Nl;0;L;;;;1;N;;;;;
12478;CUNEIFORM NUMERIC SIGN ASH TIMES TWO DISH TENU;Nl;0;L;;;;2;N;;;;;
12479;CUNEIFORM NUMERIC SIGN ASH TIMES THREE DISH TENU;Nl;0;L;;;;3;N;;;;;
1247A;CUNEIFORM NUMERIC SIGN ASH TIMES FOUR DISH TENU;Nl;0;L;;;;4;N;;;;;
1247B;CUNEIFORM NUMERIC SIGN ASH TIMES FIVE DISH TENU;Nl;0;L;;;;5;N;;;;;
1247C;CUNEIFORM NUMERIC SIGN ASH TIMES SIX DISH TENU;Nl;0;L;;;;6;N;;;;;
1247D;CUNEIFORM NUMERIC SIGN ASH TIMES SEVEN DISH TENU;Nl;0;L;;;;7;N;;;;;
1247E;CUNEIFORM NUMERIC SIGN ASH TIMES EIGHT DISH TENU;Nl;0;L;;;;8;N;;;;;
1247F;CUNEIFORM NUMERIC SIGN ASH TIMES NINE DISH TENU;Nl;0;L;;;;9;N;;;;;
```

2.3.2 Line_Break

Attached: LineBreak.txt.

```
1246F          ; AL # Nl        CUNEIFORM NUMERIC SIGN SEVEN ASH TENU
12475..1247F   ; AL # Nl    [11] CUNEIFORM NUMERIC SIGN EIGHT ASH TENU..CUNEIFORM NUMERIC SIGN
 ↪  ASH TIMES NINE DISH TENU
```

2.3.3 Script

Attached: Scripts.txt.

```
1246F         ; Cuneiform # Nl       CUNEIFORM NUMERIC SIGN SEVEN ASH TENU
12475..1247F  ; Cuneiform # Nl  [11] CUNEIFORM NUMERIC SIGN EIGHT ASH TENU..CUNEIFORM NUMERIC
 ↪  SIGN ASH TIMES NINE DISH TENU
```

3 DIŠ *tenû* numerals

This section discusses the following proposed characters:

— U+1246F 𒑯 CUNEIFORM NUMERIC SIGN SEVEN ASH TENU
— U+12475 𒑵 CUNEIFORM NUMERIC SIGN EIGHT ASH TENU
— U+12476 𒑶 CUNEIFORM NUMERIC SIGN NINE ASH TENU

3.1 Name

The existing numerals in the 𒀹 series are named U+12039 𒀹 CUNEIFORM SIGN ASH ZIDA TENU for the first one and U+1244A–U+1244E 𒑊–𒑎 CUNEIFORM NUMERIC SIGN *n* ASH TENU for the others.

Some[3] technical terms used in cuneiform character names are derived from the structural descriptions of cuneiform signs by Akkadian-speaking scribes in late second and first millennium lexical texts. In particular, the word *tenû* [Gon93,

[3] Besides *tenû*, the terms *gunû* “speckled” (with wedges), *nutillû* “unfinished”, and *šeššig* (filled with 𒊺 ŠE) are used. Contrast however the use of CROSSING rather than *gilimû*, OPPOSING rather than *igi-gubû*, or SQUARED rather than *limmubi igi-gubû*.

pp. 66 sq.; Gon00, pp. 32 sqq.; Gon03, pp. 12 sq.] is used to describe slanted signs or parts of signs: thus 𒈦 is described as 𒁇 *tenû* in [P365233, rev. 1 46′][4], 𒃷 as 𒃷 *tenû* in [P391514, rev. 2 47] and as 𒂠 *tenû* [obv. 2 80]P467315, 𒄑 as 𒄑 *tenû* in [P391514, pp. 2 33], 𒅆 as 𒅆 (containing) 𒀸 *tenû* in [P365267, obv.16′][5]. In most cases, the direction of the slant not explicitly specified. The terms *kaba tenû* and *zida tenû*, from Sumerian 𒆸 gab$_2$ “left” and 𒍣 zid “right” respectively, are used in [P345960], which contrasts 𒀺 described as *kaba tenû* and 𒀹 described as *zida tenû*.

In modern transliteration, 𒀹 numerals are described as 𒀸 *tenû* (ATF: `asz@t`) or 𒁹 *tenû* (ATF: `disz@t`), the latter being the norm in [CDLI] transliterations[6]. Informative aliases using *diš tenû* have been recommended for the existing characters in [L2/24-239]. The proposed names use ASH TENU for consistency with the already-encoded characters.

3.2 Ur III usage

As described in [Sch35, p. 135] (see Figure 1), slanted signs are used in Ur III economic texts primarily in subtractive notation with 𒇲[7] lal[8], as well as for ordinals[9] and for ages of animals in years[10].

Accounts of animals giving their ages in years rarely go beyond three-year old animals. Subtractive notation, which appears in the ED IIIa period [Rob08, p. 77], is used to compactly express numbers close to a larger round number, *e.g.*, 𒌋𒇲 $10-1$ instead of 𒐝 for 9, 𒌍𒇲 $30-2$ instead of 𒎙𒐜 for 28, or 𒁹𒇲 $60-1$ instead of 𒐐𒐝 for 59; *cf.* IX instead of VIIII in Roman numerals. It is therefore usually limited to small subtrahends[11]. Larger subtrahends do occur for quantities close to a much larger unit; however in Ur III, they are often written using 𒁹 numerals, as in [P109346, obv. 2 15] 𒐼𒂆𒇲𒑂𒊺𒆬𒄀 “4 shekels minus 7 grains of gold”, a weight which would otherwise be written 𒐈𒑚𒂆𒐐𒐈𒊺 “$3+\frac{2}{3}$ shekels and 53 grains”, as 180𒊺 $=$ 1𒂆. See also Figure 2.

Ordinals with 𒀹 numerals are also typically limited to small numbers or subtractive notation: many of the attestations of n𒀹𒄰 “nth” are in year names[12], such as 𒈬𒃼𒄯𒆠𒀀𒁺𒈫𒄰𒀸𒁀𒄾 mu kar$_2$-ḫar^{ki} a-ra$_2$ 2𒀹-kam-aš ba-ḫul “year Karhar was destroyed for the second time” (31st year of Šulgi’s reign), 𒈬𒋛𒈬𒊒𒌝𒆠𒀀𒁺𒐈𒄰𒀸𒁀𒄾 mu si-mu-ru-um^{ki} a-ra$_2$ 3𒀹-kam-aš ba-ḫul

[4] Note that while the third millennium 𒈦 and 𒁇 are related by a 45° rotation, in the Neo-Assyrian style used by this list, these signs look like 𒈦 and 𒁇, so that only one wedge is slanted, as noted in [Gon93, p. 66; Gon00, p. 34; Gon03, p. 12].

[5] These descriptions also spell out the names of the component signs; as today, they are named after one of their values: 𒃷 *tenû* is written 𒂵𒈾𒋼𒉡𒌑 *ga-na te-nu-u$_2$* after the value gan$_2$, 𒂠 *tenû* as 𒊺𒋼𒉡𒌋 *še te-nu-u* after the value še$_3$. As today, these names are not unique, see [Gon00, pp. 52 sqq.; Gon03, pp. 17 sq.], with, *e.g.*, 𒃻 being known today as NINDA, GAR (its character name), and NIG$_2$, and by the scribes as 𒉆𒁕𒆪 *nin-da-ku*, 𒂵𒊏𒆪 *ga-ra-ku*, and 𒉌𒅅 *ni-ig*.

[6] For an example of a transliteration using aš tenû, see [Gre22, §5.1.8 rev. 1 4]; note that only the HTML version uses aš tenû, the PDF uses diš.

[7] As noted in [L2/24-210R, p. 25 n. 40], the sign 𒇲 (lal, “minus”) is often ligated with the following numerals, with the subtrahend placed under a sometimes considerably enlarged 𒇲, similar to the layout of the radical in modern mathematical notation, see, *e.g.*, [P020092, rev. 3 1, 2]. The font used in this document ligates or kerns 𒀹 subtrahends, but does not enlarge the 𒇲.

[8] Also transliterated la$_2$, as in [CDLI]. In the transliterated Ur III corpus on [CDLI], out of 3304 occurrences of `(disz@t)`, 1971 are in 𒇲 n𒀹 `la2` n`(disz@t)`.

[9] 1583 out of 3304 occurrences are n𒀹𒄰 n`(disz@t)-kam`, including 647 after 𒇲

[10] 203 occurrences of `gu4`, `ab2`, `ansze`, or `dur3` n`(disz@t)`

[11] Of the 1971 Ur III occurrences of `lal` n`(disz@t)`, 1930 are with $n \le 2$, of which 1823 with $n = 1$.

[12] 430 occurrences of n`(disz@t)-kam` are on lines starting with `mu`, of which 308 are in 𒌋𒇲.

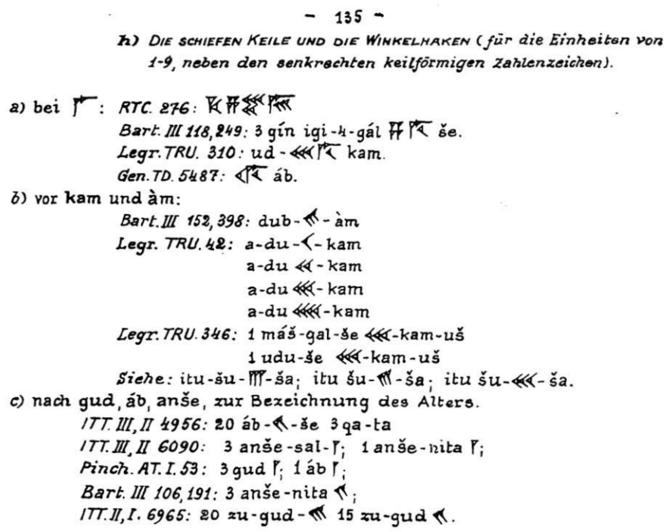


Figure 1: [Sch35, p. 135]

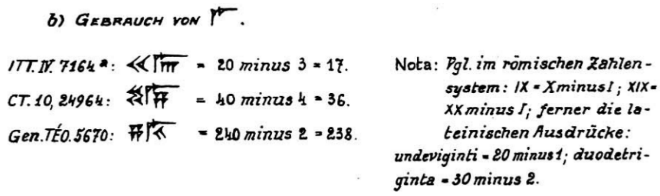


Figure 2: [Sch35, p. 132]

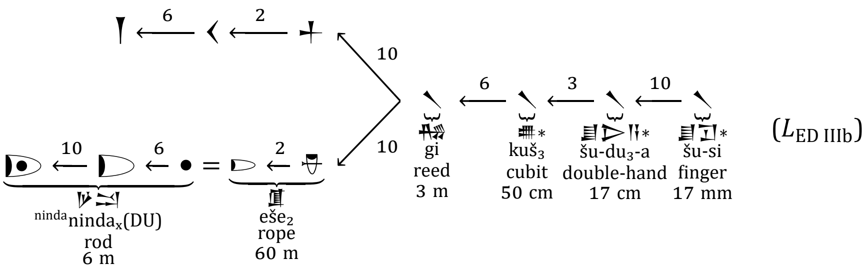
"year Simurrum was destroyed for the third time" (32nd year of Šulgi's reign), or 𒈬 𒋛𒈬𒊒𒌝𒆠 𒅇 𒇻𒇻𒁍𒌝𒆠 𒀀𒁺 𒌋𒇲𒀹𒄰𒀾 𒁀𒄾 mu si-mu-ru-um^{ki} u$_3$ lu-lu-bu-um^{ki} a-ra$_2$ 1𒌋 lal 1𒀹-kam-aš ba-ḫul "year Simurrum and Lullubum were destroyed for the ninth time" (44th year of Šulgi's reign). Larger ordinals are frequent, in particular for the day of the month, but these are written with 𒁹 numerals, thus 𒌓𒑂𒄰 for "the 7th day" or 𒌓𒎙𒐁𒄰 for "the 28th day".

The rarity of the higher 𒀹 numerals in the Ur III corpus likely explains the absence of 7𒀹–9𒀹 from the répertoire of Unicode Version 5.0, which was aiming to encode a répertoire appropriate for the Ur III period and later.

3.3 Early Dynastic usage

The situation is different in the Early Dynastic corpus. As described in [L2/24-210R], 𒀹 numerals are used in many Early Dynastic metrological systems, and in particular in the Early Dynastic IIIb length system [Pow87, p. 466; Lec16; Lec20, pp. 289 sq.;

Rob22; L2/24-210R, pp. 23 sq.]



where, as in [L2/24-210R], ∗ indicates prefix units.

While this system has a unit 1 𒉾𒁺 = 2 𒄀, lengths above 1 𒄀 are only expressed in 𒂠, or equivalently in tens of 𒉾𒁺, and in half-𒂠 equal to 10 𒄀. We can therefore expect 7–9 𒄀 to occur, expressed using 𒀹 numerals. Indeed, 37 texts in the transliterated ED IIIb corpus on [CDLI] contain undamaged attestations of either 𒀹 𒄀 or 𒀹 𒄀[13]; some of these attestations are shown in Figures 3–6. However, 𒀹 𒄀 is not attested, since instead subtractive notation is used, as in 𒁹𒁹𒁹𒐉𒂠𒇲𒄀 in [P020129, obv. 3 3], 𒁹𒐉𒉾𒁺𒇲𒄀𒌑 in [P221272, rev. 2 2], or 𒌋𒇲𒄀 in [P020304, obv. 3 8].

A similar situation occurs in some systems of capacity with 𒀹 numerals counting 𒋡 sila3, so that 𒀹 𒋡 and 𒀹 𒋡 are attested, see Figures 7 and 8.

The use of 𒀹 numerals for ordinals, especially for days, is more prevalent in the Early Dynastic period than in the Ur III period, and the use of subtractive notation is less frequent[14]. in these numbers. We therefore find attestations of 𒀹–𒀹 in "nth day", some of which are shown in Figures 9–13.

In Ebla, the 𒀹 numerals are primarily used in subtractive notation, see [Gor24, p. 88 n. 298, p. 120 n. 465, p. 167 n. 739, p. 180 n. 801]. However, contrary to Ur III, 𒀹 numerals remain used for large subtrahends, thus [Gor24, p. 101 n. 355] cites occurrences of 𒐉𒇲𒀹 for 36 and 𒁹𒇲𒀹𒌋𒈪𒀜[15] for 94. In particular, [Gor24, pp. 129 sq.] cites occurrences of 𒇲9𒀹 in Ebla, shown in Figure 14.

Figure 3: 𒁹𒌍[16]𒀹𒄀𒁲 "501 m (first) width" (of a field) in [P221254, obv. 3 7] from ED IIIb Ŋirsu. Left: Copy from [All08]. Right: [CDLI] photograph.

[13]Of those, 34 have 𒀹 𒄀 and 9 have 𒀹 𒄀.
[14]Although also attested, see, *e.g.*, [P221346, rev. 3 6] 𒌓𒌋𒇲𒀹, [P221006, rev. 2 1] 𒌓𒌓𒌋𒇲𒀹
[15]Recall that 𒈪𒀜 *mi-at* is Eblaite for "hundred", see [Arc15, p. 33; L2/24-210R, p. 27].
[16]The 𒌋 numeral here has trapezoidal stylus impressions, rather than the right-angled triangle typical

Figure 4: “21 m of reed-bed dyke” (attributed to the farmer) in [P221266, obv. 1 1] from ED IIIb Ŋirsu. Left: Copy from [All08]. Right: [Louvre] photograph.

Figure 5: [17] “1344 m, its height 2 m” (dimensions of a dyke on the river) in [P020303, obv. 2 2] from ED IIIb Ŋirsu. Left: Copy from [Mar91]. Right: [CDLI] photograph.

This sign contains some hatching (or). A contrast is made in [Mit06] between SUKUD (containnig) and GALAM It is unclear at this time whether this should be addressed in the encoding.

of Ur III and later. While [Gor24, p. 106] distinguishes rhomboidal impressions from cuneiform ones, there is no contrast, and one finds a continuous glyphic range of trapezia of various shapes between the triangular impressions and the rhomboidal ones. All should be encoded , and Early Dynastic fonts should use a trapezoidal or rhomboidal glyph as stylistically appropriate. Mechanically, the quadrilateral impressions are made with a stylus rotated counterclockwise compared to normal wedges, so that a fourth side is impressed by a fourth face of the stylus opposite the right face: three edges of the left face are impressed.

Figure 6: “444 m equal widths” (of a field) in [P221254, obv. 1 2]. Left: Copy from [All08]. Right: [CDLI] photograph.

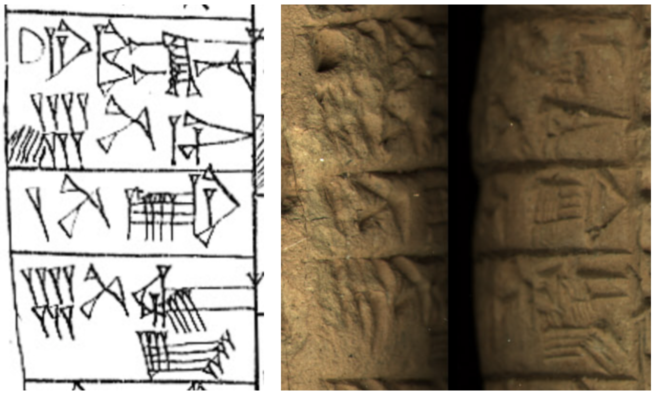


Figure 7: / / “1 niŋbanda 7 sila of butter, 1 sila of cream, 7 sila of dates” in [P020182, rev. 3 5–7] from ED IIIb Ŋirsu. Left: Copy from [För16]. Right: [CDLI] photograph.

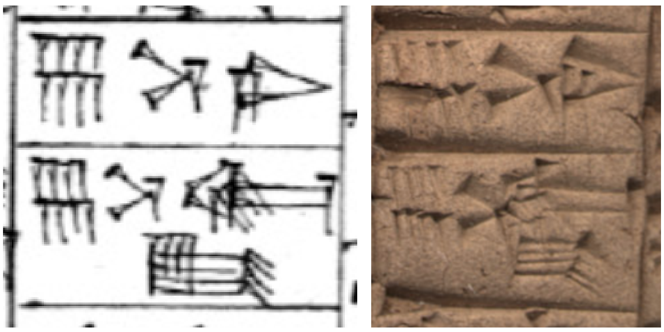


Figure 8: / “8 sila of butter, 8 sila of dates” in [P221730, rev. 2 5–6] from ED IIIb Ŋirsu. Left: Copy from [Ник08]. Right: [CDLI] photograph.

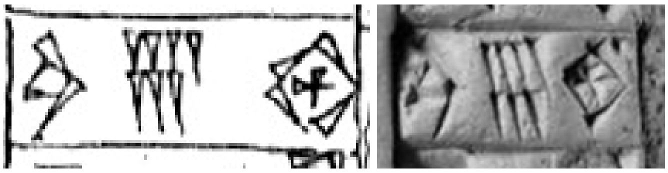


Figure 9: “seventh day” in [P220703, rev. 2 7] from ED IIIb Ŋirsu. Left: Copy from [All08]. Right: [Louvre] photograph.

Figure 10: “seventh day passed” in [P221590, obv. 2 3] from ED IIIb Nippur. Left: Copy from [Wes75]. Right: [CDLI] photograph.

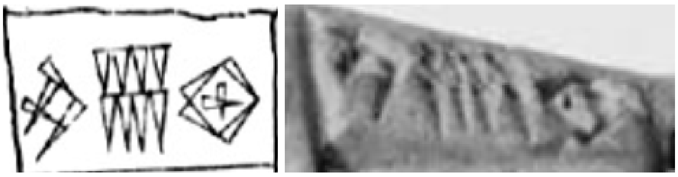


Figure 11: “eighth day” in [P220703, rev. 3 1]. Left: Copy from [All08]. Right: [Louvre] photograph.

Figure 12: “ninth day passed” in [P452986, obv. 1 1] (ED IIIa). [CDLI] photograph.

Figure 13: "ninth day" in [P222129, obv. 1 2] from ED IIIa Šuruppag. Left: Copy from [MPVW01]. Right: [CDLI] photograph.

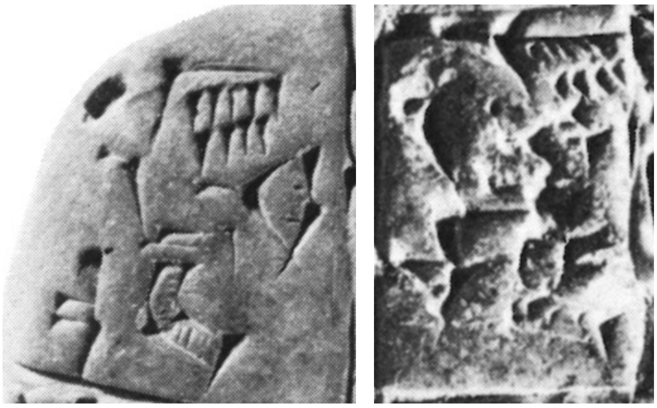


Figure 14: Left: "9 minas and 51 shekels of silver" in [P241283, *recto* 1 1]; right: "1 mina and 51 shekels of silver" in [P241325, *verso* 3 2], both from Ebla. Photographs from [EbDA].

3.4 Glyphs

As illustrated in the above figures, the angle of the varies, and is not always faithfully reproduced in copies. The representative glyphs retain the same angle used for the already-encoded numerals.

The stacking patterns for the proposed characters do not vary among the attestations cited above. Note that stacking patterns are known to vary for other numerals in this series; for instance, and sometimes appear with all wedges in a row in ED IIIa tablets, as in [P010787; P010896; P010928]. As discussed in [L2/24-210R, pp. 45 sqq.], the disunification of variant stacking patterns poses problems when producing cuneiform text from transliterated corpora, as the stacking patterns are not normally indicated in transliteration, and the default stacking pattern varies over time: in Ur III, in Neo-Assyrian. While , , and numerals needed to have their stacking patterns disunified for compatibility with [Bor10], this practice should not be extended to Early Dynastic stacking patterns of , , and numerals, nor to numerals.

4 AŠ×(DIŠ *tenû*) numerals

This section discusses the following proposed characters:

— U+12477 CUNEIFORM NUMERIC SIGN ASH TIMES ONE DISH TENU
— U+12478 CUNEIFORM NUMERIC SIGN ASH TIMES TWO DISH TENU
— U+12479 CUNEIFORM NUMERIC SIGN ASH TIMES THREE DISH TENU
— U+1247A CUNEIFORM NUMERIC SIGN ASH TIMES FOUR DISH TENU
— U+1247B CUNEIFORM NUMERIC SIGN ASH TIMES FIVE DISH TENU
— U+1247C CUNEIFORM NUMERIC SIGN ASH TIMES SIX DISH TENU
— U+1247D CUNEIFORM NUMERIC SIGN ASH TIMES SEVEN DISH TENU
— U+1247E CUNEIFORM NUMERIC SIGN ASH TIMES EIGHT DISH TENU
— U+1247F CUNEIFORM NUMERIC SIGN ASH TIMES NINE DISH TENU

4.1 Name

As indicated by their name, these signs consist of a horizontal wedge (AŠ) with an overlaid 𒀹 numeral. Their ATF name is *n*(|ASZ×DISZ@t|), as ATF numerals are of the form *n*(⟨name⟩). Since we have no such restriction in Unicode character names, we move the number before the DISH TENU to better describe their structure. These numerals are not described in terms of AŠ *tenû*, so we follow [CDLI] and [OSL] terminology instead of attempting consistency with the names of the 𒀹 series. Two characters already have DISH TENU in their names: U+12483 CUNEIFORM SIGN BAD TIMES DISH TENU and U+12543 CUNEIFORM SIGN ZU5 TIMES THREE DISH TENU.

4.2 Usage

These numerals are used in the Early Dynastic IIIb period to indicate regnal years. They are extremely well attested, with 1482 artefacts containing (|ASZxDISZ@t|) in the current transliterated [CDLI] corpus. Almost all attestations are from Ŋirsu, and most of them are in regnal years of 𒌷𒅗𒄀𒈾 (Irikaginak[18]) and his predecessor 𒈗𒀭𒁕 (Lugalanda), but their use is also attested in regnal years of earlier rulers in the first dynasty of Lagaš: 72 tablets dated to the reign of 𒂗𒂗𒋻𒍣 (Enentarzid), [P247594] possibly[19] dated to the reign of 𒂗𒀭𒈾𒁺 (Enanatum) the second, [P222224] to the reign of 𒂗𒋼𒈨𒈾 (Enmetenak[20]), and [P221783] from Lagaš to the reign of 𒂗𒀭𒈾𒁺 the first.

Where attested[21], regnal years beyond the ninth are written differently: 𒌋 for the 10th year of 𒌷𒅗𒄀𒈾 in [P222640], and with subtractive subtraction for the 17th[22] written 𒎙𒇲 in [P221483, rev. 4 12] and the 19th year of 𒂗𒋼𒈨𒈾 written 𒎙𒇲 in [P221413, rev. 3 3; P222223, rev. 3 3]. The numeral series therefore stops at 𒀸×9𒀹. Figures 15–24 show these numerals used in ancient and modern text.

[18]variously transliterated iri-inim-gi-na, uru-ka-gi-na, etc., see [SS15, p. 72 n. 158] and literature referenced therein.

[19]Dated instead to the reign of 𒌷𒅗𒄀𒈾 by [SS15, p. 70].

[20]Transliteration: en-mete-na, sometimes en-te-me-na.

[21]The length of the reign of 𒈗𒀭𒁕 (6 years and 1 month) and the dearth of documents dated to the reign of 𒌷𒅗𒄀𒈾 after his defeat by 𒈗𒍠𒄀𒋛 mean that these are quite rare; see [SS15, p. 71, p. 74 n. 176].

[22]This text mentions 𒂗𒂗𒋻𒍣 as temple administrator. See [SS15, p. 69] for its attribution to the reign of 𒂗𒋼𒈨𒈾.

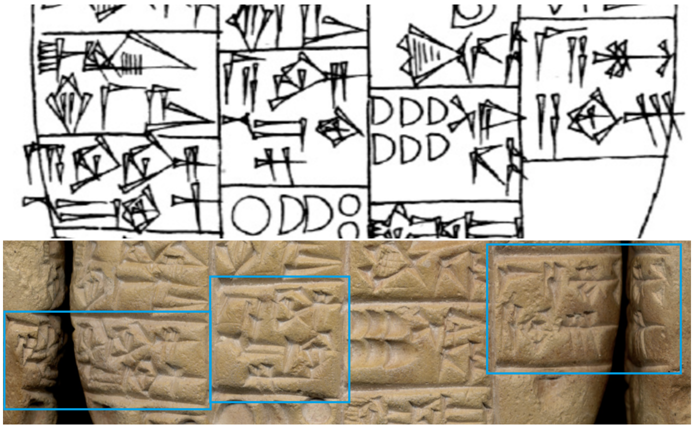


Figure 15: Obverse of [P220930], showing “arrears of the year before last 1 (of the reign of)”, “arrears of last year 2”, “arrears of this year 3”. The arrears in question consist of fish and turtles. Top: Copy from [All08]. Bottom: [CDLI] photograph.

A connection of IM with the later usage of im(.ma) (presargonic Lagash and later; Akkadian šaddaqdi/a(m) with lexical equivalent MU.IM.MA [MSL 5, 65:195]), meaning “previous (year)” is not apparent. For the latter usage cf. particularly DP 280 (= 281), a presargonic temple document which “loads onto the backs” (gu_2.ne.ne.a e.ne.gar) of the fisheries foremen Ne.sag and Lugal.$ša_3$.la_2.tuku the quota arrears of im.im.ma.kam, im.ma.kam and mu.a.kam, that is of the year before last = year one (of the king UruKAgina [second regnal year]), of last year = year 2 and of this year = year 3 Also DP 243 goats of various colors / maš im.ma.kam / ditto / maš mu.a.kam and DP 94. maš im.ma as delivery arrears noted after grown nannies (ud_5) and before maš $ša_3$.HI (//mu.a.kam, “of the current year”), further maš im.ma = maš.gal.gal in the summation rev i2 (see footnote 17 to the notations of the type). A parallel usage is found in the Old Akkadian text ITT 2/1, 3078 obv 1-4. 3 1/2 ma.na siki / [i]m.ma.kam / 1 gu_2 la_2.4 ma.na siki / mu.a.kam. It would seem difficult to reconcile this clear usage im = “previous year” with the often translated im = “account tablet” (im = clay)

Figure 16: Discussion of notation for year names in [Eng88, p. 166 n. 37], referring to [P220930]. See Figure 15.

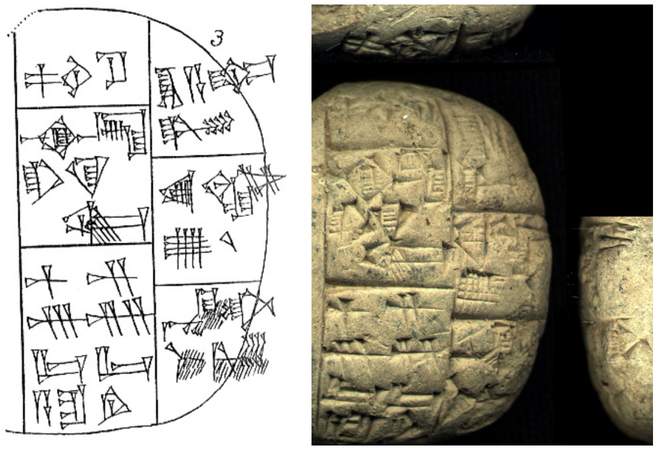


Figure 17: / / / “Donkey skins property of Enentarzid ensik of Lagaš. (Years) 1 2 3 4 are all put together.” in [P020133, rev. 1 2 sqq.]. Left: Copy from [För16]. Right: [CDLI] photograph.

Figure 18: “Silver payment 5th and 6th (years of Lugalanda)” in [P221169, rev. 3 2], dated to the 1st year of . Left: Copy from [All08]. Right: [CDLI] photograph.

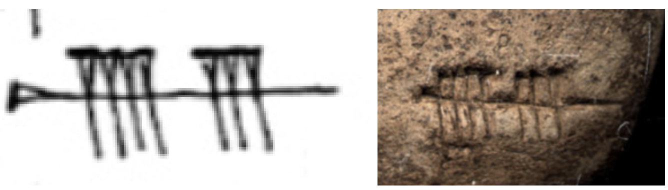


Figure 19: (of) in [P222006, obv. 2 3]. Left: Copy from [Ник08]. Right: [CDLI] photograph.

Figure 20: 𒌷𒅗𒄀𒈾𒀝 / 𒈗 / 𒉢𒁓𒆷𒆠 / 𒐍 "Irikaginak king of Lagaš, year 7" in [P386436, obv. 2 4 sqq.]. Left: Copy from [Cri10]. Right: [CDLI] photograph.

Figure 21: 𒁺𒈬 𒐍 "carried off, (year) 7 (of Lugalanda)" in [P221075, rev. 3 6], dated to the 1st year of 𒌷𒅗𒄀𒈾𒀝. Left: Copy from [All08]. Right: [CDLI] photograph.

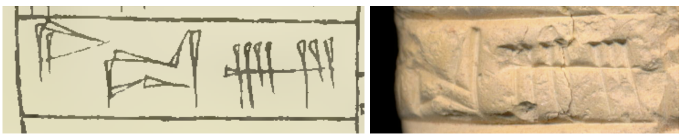


Figure 22: 𒌈𒈬 𒐍 "delivered, (year) 7 (of Lugalanda)" in [P221034, rev. 2 5], dated to the 1st year of 𒌷𒅗𒄀𒈾𒀝. Left: Copy from [All08]. Right: [CDLI] photograph.

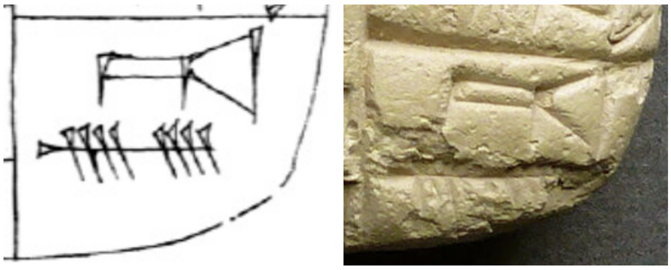


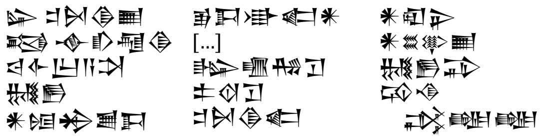
Figure 23: 𒈬 [cuneiform] (referencing the year 8 of [cuneiform]) in [P222224, rev. 2 4]. Left: Copy from [CHT10]. Right: [Louvre] photograph.

Figure 24: [cuneiform] (of [cuneiform]) in [P221906, rev. 2]. Left: Copy from [Нико8]. Right: [CDLI] photograph.

4.3 Glyphs

The 𒀹 wedges in these numerals are consistently grouped for numbers above [cuneiform]: [cuneiform] 2-2, [cuneiform] 3-2, [cuneiform] 3-3, [cuneiform] 4-3, [cuneiform] 4-4, and [cuneiform] 3-3-3. The representative glyphs follow this grouping. [cuneiform] is sometimes grouped more finely 2-2-3, as in [P221075, obv. 3 6; P221034, rev. 2 5]. Grouping distinctions are not marked in transliteration (and often even lost in copy, as in Figure 22), are not contrastive, and should not be represented in encoding. The 𒀹 wedges are not stacked until the reign of [cuneiform], the notation for whose regnal years is discussed in §4.4.

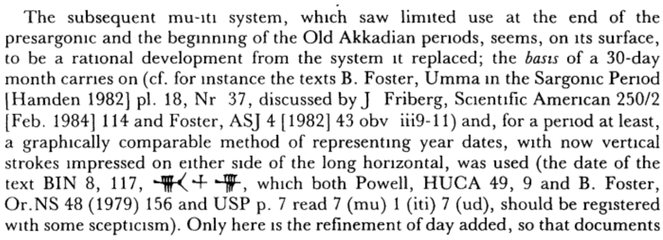
4.4 Later usage



Having raided Lagaš, the leader of Umma surely committed a sin against Ninŋirsu! […] May Nisaba, the personal god of Lugalzagesi, the ruler of Umma, take the responsibility for the punishment!

[P222618, rev. 2 10 sqq.], translation [ETCSRI]

A different notation of regnal years is used during the reign of , sometimes involving numerals of the form . These numerals are less comprehensively attested, and their interpretation is sometimes still unclear, see Figure 25. The co-occurrence and likely contrast of and in [P221534] may preclude treating the former as a stylistic variant of the former. Note that U+12483 CUNEIFORM SIGN BAD TIMES DISH TENU is already encoded as a non-numeric character, and should be used for 1(×) if needed. These numerals are not being proposed at this time.



The subsequent mu-iti system, which saw limited use at the end of the presargonic and the beginning of the Old Akkadian periods, seems, on its surface, to be a rational development from the system it replaced; the *basis* of a 30-day month carries on (cf. for instance the texts B. Foster, Umma in the Sargonic Period [Hamden 1982] pl. 18, Nr 37, discussed by J Friberg, Scientific American 250/2 [Feb. 1984] 114 and Foster, ASJ 4 [1982] 43 obv iii9-11) and, for a period at least, a graphically comparable method of representing year dates, with now vertical strokes impressed on either side of the long horizontal, was used (the date of the text BIN 8, 117, , which both Powell, HUCA 49, 9 and B. Foster, Or.NS 48 (1979) 156 and USP p. 7 read 7 (mu) 1 (iti) 7 (ud), should be registered with some scepticism). Only here is the refinement of day added, so that documents

Figure 25: Discussion of late presargonic dates in [Eng88, p. 144 n. 11]. Note that the reference to [P221534] should read BIN 8, 116, rather than 117.

Acknowledgements

TODO(egg): Acknowledge reviewers. Robin Leroy authored the bulk of the text. Erica Scarpa suggested several useful references. Steve Tinney provided essential assistance on the reading of the Sumerian texts, suggested useful references, and provided valuable feedback on early drafts of the document.

The Neo-Assyrian font is *Assurbanipal* and the Neo-Babylonian font is *Esagil*, fonts created by Sylvie Vanséveren, available on the Hethitologie Portal Mainz [Van21]. The *CuneiformComposite* font by Steve Tinney is used for the reference glyphs of already-encoded cuneiform; the proposed reference glyphs were produced by Robin Leroy based on *CuneiformComposite*. A modified version of *Noto Sans Cuneiform*, by Monotype Imaging, is used for most of the cuneiform text in this document; it incorporates glyphs by Steve Tinney for the characters proposed in this document. The font used for the characters proposed in [L2/24-210R] is the one used in that proposal, by Robin Leroy, Anshuman Pandey, and Steve Tinney.

Arabic text is set in *Scheherazade New* by SIL International; monospace text is set in *Consolas* by Luc(as) de Groot; the remainder of the text is set in *Cambria* and *Cambria Math* by Monotype Imaging and Tiro Typeworks.

References

Artefacts

[P010787] Ist Š 0251.
CDLI: P010787.
ORACC: dccmt/P010787.

[P010896] Ist Š 0752.
CDLI: P010896.
ORACC: epsd2/P010896.

[P010928] Ist Š 0878.
CDLI: P010928.
ORACC: epsd2/P010928.

[P020092] VAT 04428. Berlin, Germany: Vorderasiatisches Museum.
CDLI: P020092.
ORACC: epsd2/P020092.

[P020129] VAT 04713. Berlin, Germany: Vorderasiatisches Museum.
CDLI: P020129.
ORACC: epsd2/P020129.

[P020133] VAT 04884.
CDLI: P020133.
ORACC: epsd2/P020133.

[P020182] VAT 04405. Berlin, Germany: Vorderasiatisches Museum.
CDLI: P020182.
ORACC: epsd2/P020182.

[P020303] VAT 04852.
CDLI: P020303.
ORACC: epsd2/P020303.

[P020304] VAT 04855.
CDLI: P020304.
ORACC: epsd2/P020304.

[P109346] FLP 0558.
CDLI: P109346.
ORACC: epsd2/P109346.

[P131747] AO 05676. Paris, France: Musée du Louvre.
CDLI: P131747.
ORACC: epsd2/P131747.

[P220703] AO 13261. Paris, France: Musée du Louvre.
CDLI: P220703.
ORACC: epsd2/P220703.
Louvre Collections: ark:/53355/cl010120690.

[P220930] AO 13488. Paris, France: Musée du Louvre.
CDLI: P220930.
ORACC: epsd2/P220930.

[P221006] AO 13562. Paris, France: Musée du Louvre.
CDLI: P221006.
ORACC: epsd2/P221006.

[P221034] AO 13590. Paris, France: Musée du Louvre.
CDLI: P221034.
ORACC: epsd2/P221034.

[P221075] AO 13631. Paris, France: Musée du Louvre.
CDLI: P221075.
ORACC: epsd2/P221075.

[P221169] AO 13726. Paris, France: Musée du Louvre.
CDLI: P221169.
ORACC: epsd2/P221169.

[P221254] AO 13812. Paris, France: Musée du Louvre.
CDLI: P221254.
ORACC: epsd2/P221254.

[P221266] AO 13825. Paris, France: Musée du Louvre.
CDLI: P221266.
ORACC: epsd2/P221266.
Louvre Collections: ark:/53355/cl010138527.

[P221272] AO 13831. Paris, France: Musée du Louvre.
CDLI: P221272.
ORACC: epsd2/P221272.

[P221346] SM 1904.07.004.
CDLI: P221346.
ORACC: epsd2/P221346.

[P221413] AO 04037. Paris, France: Musée du Louvre.
CDLI: P221413.
ORACC: epsd2/P221413.

[P221483] MLC 01497.
CDLI: P221483.
ORACC: epsd2/P221483.

[P221534] NBC 05930.
CDLI: P221534.
ORACC: epsd2/P221534.

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CDLI: P221590.
ORACC: epsd2/P221590.

[P221730] Erm 14023.
CDLI: P221730.
ORACC: epsd2/P221730.

[P221783] Excavation 2 H-T 012.
CDLI: P221783.
ORACC: epsd2/P221783.

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CDLI: P221906.
ORACC: epsd2/P221906.

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CDLI: P222006.
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CDLI: P222223.
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