Twelve cuneiform *tenû* numerals

Robin Leroy and Steve Tinney

2024-12-17

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, 7𒐗[1]–9𒐗, where 1𒐗 = 𒐗 through 6𒐗 = 𒐙 are already encoded. Their glyphic range and usage are discussed in §3. The other proposed characters constitute a new series of numerals, formed by 𒐗 numerals crossing an 𒐕 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

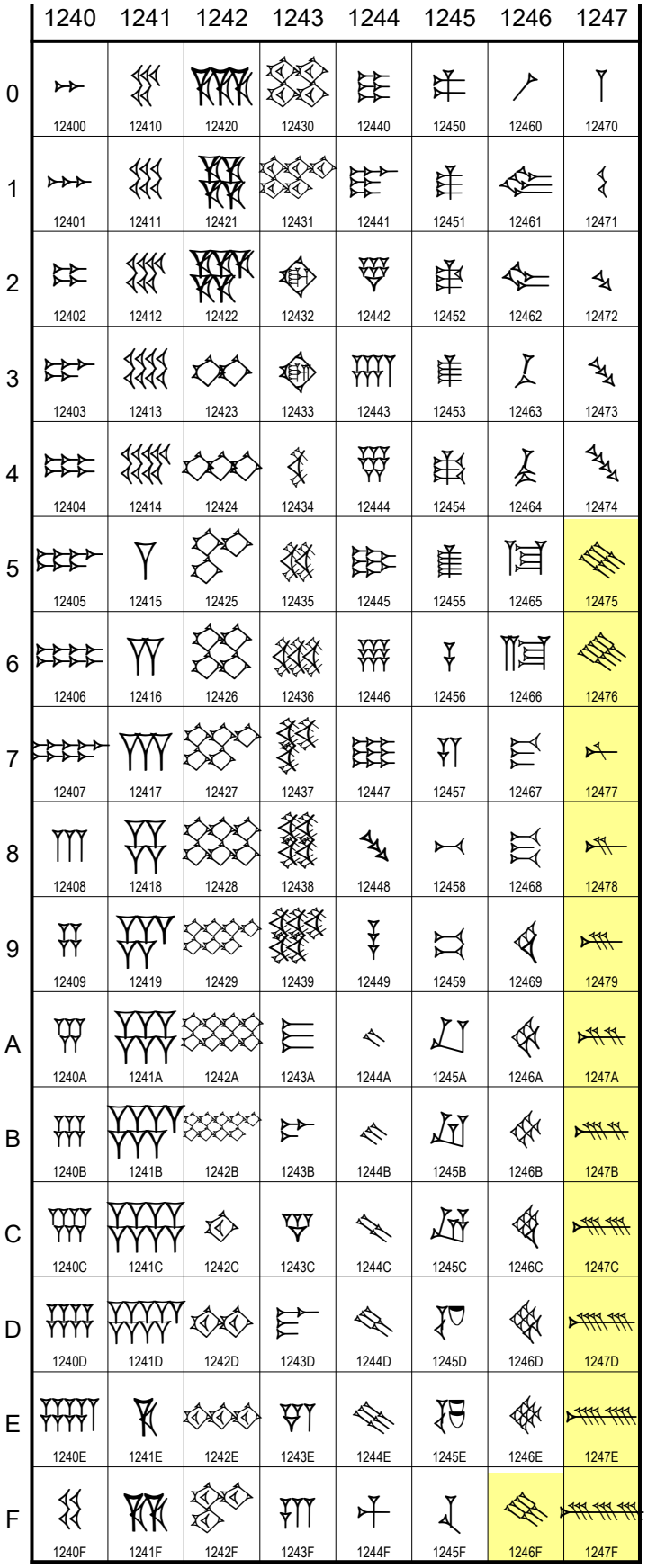
No change is needed in the core specification.

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. The cuneiform font CuneiformComposite.ttf used to produce this chart 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 CUNEIFORM NUMERIC SIGN TWO ASH
= 2 iku
→ 12038 cuneiform sign ash
→ 12551 cuneiform numeric sign two n01
→ 1264D cuneiform numeric sign two n01 flat

12401 CUNEIFORM NUMERIC SIGN THREE ASH
12402 CUNEIFORM NUMERIC SIGN FOUR ASH
12403 CUNEIFORM NUMERIC SIGN FIVE ASH
12404 CUNEIFORM NUMERIC SIGN SIX ASH
12405 CUNEIFORM NUMERIC SIGN SEVEN ASH
12406 CUNEIFORM NUMERIC SIGN EIGHT ASH
12407 CUNEIFORM NUMERIC SIGN NINE ASH
12408 CUNEIFORM NUMERIC SIGN THREE DISH
→ 12079 cuneiform sign dish
→ 1222B cuneiform sign min
→ 12559 cuneiform numeric sign three n08

12409 CUNEIFORM NUMERIC SIGN FOUR DISH
= 4 bariga
1240A CUNEIFORM NUMERIC SIGN FIVE DISH
1240B CUNEIFORM NUMERIC SIGN SIX DISH
1240C CUNEIFORM NUMERIC SIGN SEVEN DISH
1240D CUNEIFORM NUMERIC SIGN EIGHT DISH
1240E CUNEIFORM NUMERIC SIGN NINE DISH
1240F CUNEIFORM NUMERIC SIGN FOUR U
= 4 bur_3
→ 1230B cuneiform sign u
→ 12399 cuneiform sign u u
→ 1230D cuneiform sign u u u
→ 12565 cuneiform numeric sign four n14
→ 12659 cuneiform numeric sign four n14 flat

12410 CUNEIFORM NUMERIC SIGN FIVE U
12411 CUNEIFORM NUMERIC SIGN SIX U
12412 CUNEIFORM NUMERIC SIGN SEVEN U
12413 CUNEIFORM NUMERIC SIGN EIGHT U
12414 CUNEIFORM NUMERIC SIGN NINE U
12415 CUNEIFORM NUMERIC SIGN ONE GESH2
→ 1256B cuneiform numeric sign one n34

12416 CUNEIFORM NUMERIC SIGN TWO GESH2
12417 CUNEIFORM NUMERIC SIGN THREE GESH2
12418 CUNEIFORM NUMERIC SIGN FOUR GESH2
12419 CUNEIFORM NUMERIC SIGN FIVE GESH2
1241A CUNEIFORM NUMERIC SIGN SIX GESH2
1241B CUNEIFORM NUMERIC SIGN SEVEN GESH2
1241C CUNEIFORM NUMERIC SIGN EIGHT GESH2
1241D CUNEIFORM NUMERIC SIGN NINE GESH2
1241E CUNEIFORM NUMERIC SIGN ONE GESHU
→ 12574 cuneiform numeric sign one n48

1241F CUNEIFORM NUMERIC SIGN TWO GESHU
12420 CUNEIFORM NUMERIC SIGN THREE GESHU
12421 CUNEIFORM NUMERIC SIGN FOUR GESHU
12422 CUNEIFORM NUMERIC SIGN FIVE GESHU
12423 CUNEIFORM NUMERIC SIGN TWO SHAR2
→ 122B9 cuneiform sign shar2
→ 12579 cuneiform numeric sign two n45

12424 CUNEIFORM NUMERIC SIGN THREE SHAR2
12425 CUNEIFORM NUMERIC SIGN THREE SHAR2 VARIANT FORM
12426 CUNEIFORM NUMERIC SIGN FOUR SHAR2
12427 CUNEIFORM NUMERIC SIGN FIVE SHAR2
12428 CUNEIFORM NUMERIC SIGN SIX SHAR2
12429 CUNEIFORM NUMERIC SIGN SEVEN SHAR2
1242A CUNEIFORM NUMERIC SIGN EIGHT SHAR2
1242B CUNEIFORM NUMERIC SIGN NINE SHAR2
1242C CUNEIFORM NUMERIC SIGN ONE SHARU
→ 12582 cuneiform numeric sign one n50

1242D CUNEIFORM NUMERIC SIGN TWO SHARU
1242E CUNEIFORM NUMERIC SIGN THREE SHARU
1242F CUNEIFORM NUMERIC SIGN THREE SHARU VARIANT FORM
12430 CUNEIFORM NUMERIC SIGN FOUR SHARU
12431 CUNEIFORM NUMERIC SIGN FIVE SHARU
12432 CUNEIFORM NUMERIC SIGN SHAR2 TIMES GAL PLUS DISH
12433 CUNEIFORM NUMERIC SIGN SHAR2 TIMES GAL PLUS MIN

Area measures

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

12435 CUNEIFORM NUMERIC SIGN TWO BURU
12436 CUNEIFORM NUMERIC SIGN THREE BURU
12437 CUNEIFORM NUMERIC SIGN THREE BURU VARIANT FORM
12438 CUNEIFORM NUMERIC SIGN FOUR BURU
12439 CUNEIFORM NUMERIC SIGN FIVE BURU

Variant stacking patterns

1243A CUNEIFORM NUMERIC SIGN THREE VARIANT FORM ESH16
1243B CUNEIFORM NUMERIC SIGN THREE VARIANT FORM ESH21
1243C CUNEIFORM NUMERIC SIGN FOUR VARIANT FORM LIMMU
1243D CUNEIFORM NUMERIC SIGN FOUR VARIANT FORM LIMMU4
1243E CUNEIFORM NUMERIC SIGN FOUR VARIANT FORM LIMMU A
1243F CUNEIFORM NUMERIC SIGN FOUR VARIANT FORM LIMMU B
12440 CUNEIFORM NUMERIC SIGN SIX VARIANT FORM ASH9
12441 CUNEIFORM NUMERIC SIGN SEVEN VARIANT FORM IMIN3
12442 CUNEIFORM NUMERIC SIGN SEVEN VARIANT FORM IMIN A
12443 CUNEIFORM NUMERIC SIGN SEVEN VARIANT FORM IMIN B
12444 CUNEIFORM NUMERIC SIGN EIGHT VARIANT FORM USSU
12445 CUNEIFORM NUMERIC SIGN EIGHT VARIANT FORM USSU3
12446 CUNEIFORM NUMERIC SIGN NINE VARIANT FORM ILIMMU
12447 CUNEIFORM NUMERIC SIGN NINE VARIANT FORM ILIMMU3
12448 CUNEIFORM NUMERIC SIGN NINE VARIANT FORM ILIMMU4
12449 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 CUNEIFORM NUMERIC SIGN TWO ASH TENU
= 2 diš tenû
→ 12039 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 𒐹 series are named U+12039 𒐹 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 𒋛 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 𒑉 is described as 𒁁 *tenû* in [P365233, rev. 1 46′][4], 𒄭 as 𒃶 *tenû* in [P391514, rev. 2 47] and as 𒂠 *tenû* [obv. 2 80]P467315, 𒑋 as 𒀿 *tenû* in [P391514, 2 33], 𒁒 as 𒁓 (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 𒃮 gab$_2$ "left" and 𒍣 zid "right" respectively, are used in [P345960], which contrasts 𒑘 described as *kaba tenû* and 𒑙 described as *zida tenû*.

In modern transliteration, 𒑙 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 𒎙𒐛 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] 𒐉𒁾𒇲𒐛𒊺𒆬𒄀 "4 shekels minus 7 grains of gold", a weight which would otherwise be written 𒐈𒑚𒁾𒐐𒐈𒊺 "3 + $\frac{2}{3}$ shekels and 53 grains", as 180𒊺 = 1𒁾. See also Figure 2.

Ordinals with 𒑙 numerals are also typically limited to small numbers or subtractive notation: many of the attestations of n𒑙𒃰 "nth" are in year names[12], such as 𒈬𒋼𒄯𒆠 𒀀𒊏 𒐖𒑙𒃰𒀸 𒁀𒄾 mu kar$_2$-ḫar^{ki} a-ra$_2$ 2𒑙-kam-aš ba-ḫul "year Karhar was destroyed for the second time" (31st year of Šulgi's reign), 𒈬𒋛𒈬𒊒𒌝𒆠 𒀀𒊏 𒐈𒑙𒃰𒀸 𒁀𒄾 mu si-mu-ru-um^{ki} a-ra$_2$ 3𒑙-kam-aš ba-ḫul

[4] Note that while the third millennium 𒁁 and 𒁁 are related by a 45° rotation, in the Neo-Assyrian style used by this list, these signs look like 𒑉 and 𒁁, 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: 𒃶 *tenû* is written 𒂵𒈾𒋼𒉡𒌑 *ga-na te-nu-u$_2$* after the value gan$_2$, 𒂠 *tenû* as 𒊺𒋼𒉡𒌑 *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 𒉌𒅆𒁕𒆪 *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 𒑙 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 𒇲n𒑙 `la2` n`(disz@t)`.

[9] 1583 out of 3304 occurrences are n𒑙𒃰 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 $n \leq 2$, 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.

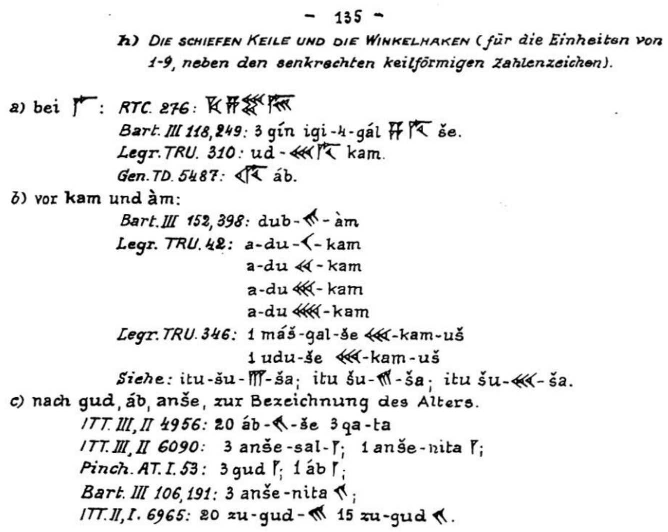


Figure 1: [Sch35, p. 135]

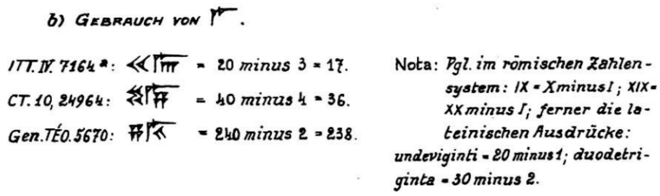


Figure 2: [Sch35, p. 132]

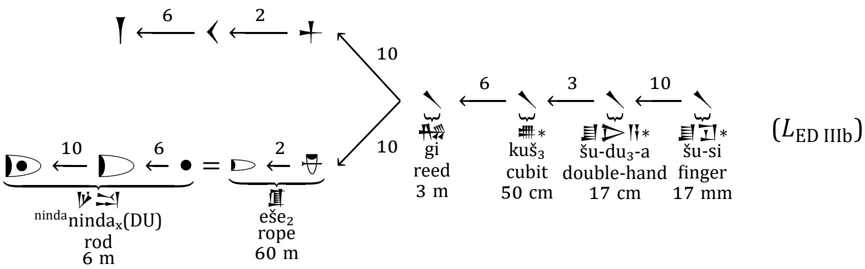
"year Simurrum was destroyed for the third time" (32nd year of Šulgi's reign), or 𒈬 𒋛𒈬𒊒𒌝𒆠 𒅇 𒇻𒇻𒁍𒌝𒆠 𒀀𒊏 𒌋𒇲𒁺𒄰𒀸 𒁀𒄾 mu si-mu-ru-um^{ki} u$_3$ lu-lu-bu-um^{ki} a-ra$_2$ 1𒌋 lal 1𒁺-kam-aš ba-ḫul "year Simurrum and Lullubum were destroyed for the ninth time" (44th year of Šulgi's reign). Larger ordinals are frequent,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

The rarity of the higher 𒁺 numerals in the Ur III corpus likely explains the absence of 7𒁺–9𒁺 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], 𒁺 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 𒃻𒁺 = 2 𒄀, lengths above 1 𒄀 are only expressed in 𒂠, or equivalently in tens of 𒃻𒁺, 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 𒑂𒄀 or 𒑃𒄀[13]; some of these attestations are shown in Figures 3–6. However, 𒑄𒄀 is not attested, since instead subtractive notation is used, as in 𒐼𒐼𒐼𒐉𒂠𒈨𒄀 in [P020129, obv. 3 3], 𒐼𒐊𒃻𒁺𒈨𒄀𒍑𒀸 in [P221272, rev. 2 2], or 𒌋𒈨𒄀 in [P020304, obv. 3 8].

A similar situation occurs in some systems of capacity with 𒀹 numerals counting 𒋡 sila₃, so that 𒑂𒋡 and 𒑃𒋡 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 𒑂–𒑄 in "*n*th 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 𒐉𒈨𒀸 for 36 and 𒐼𒈨𒀸𒌋𒈨[15] for 94. In particular, [Gor24, pp. 129 sq.] cites occurrences of 𒈨9𒀹 in Ebla, shown in Figure 14.

Figure 3: 𒁹𒎙[16]𒑂𒄀𒂊 "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 𒑂𒄀 and 9 have 𒑃𒄀.

[14] Although also attested, see, *e.g.*, [P221346, rev. 3 6] 𒌓𒌋𒈨𒄀, [P221006, rev. 2 1] 𒌓𒌓𒌋𒈨𒀸𒄀.

[15] Recall that 𒌋𒈨 *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

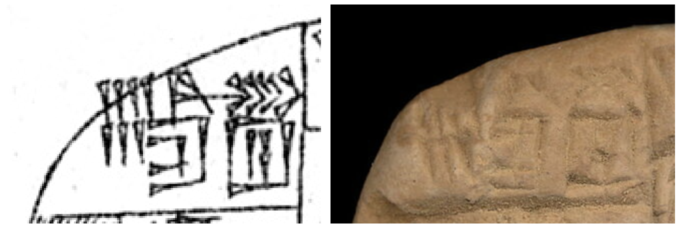


Figure 4: “21 m of reed-bed dyke” (attributed to the farmer) in [P221266, obv. 1 1] from ED IIIb Ŋirsu. Left: Copy from [All08]. Right: [Louvre] photograph.

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.

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.

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

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

Figure 7: 𒃻𒁀𒀾𒁕 𒐼𒋡 𒉌 / 𒑉𒋡 𒂵 / 𒐼𒋡 𒅗𒈝 "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[18].

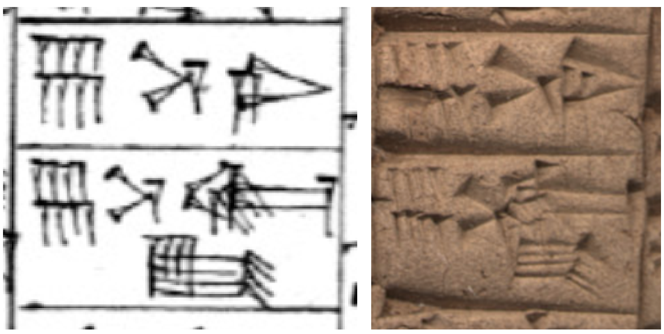


Figure 8: 𒐼𒋡 𒉌 / 𒐼𒋡 𒅗𒈝 "8 sila of butter, 8 sila of dates" in [P221730, rev. 2 5–6] from ED IIIb Ŋirsu. Left: Copy from [Ник08]. Right: [CDLI] photograph.

[18] Where photographs of the same object from multiple angle are shown, the third angle projection method is used, as it puts the views in the direction of reading. This is indicated in this document by the use of the symbol defined in [ISO5456-2, Subclause 5.2].

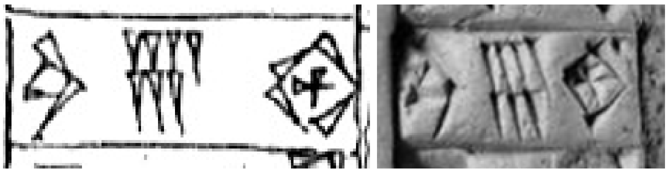


Figure 9: 𒌓𒐌𒄰 “seventh day” in [P220703, rev. 2 7] from ED IIIb Ŋirsu. Left: Copy from [All08]. Right: [Louvre] photograph.

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

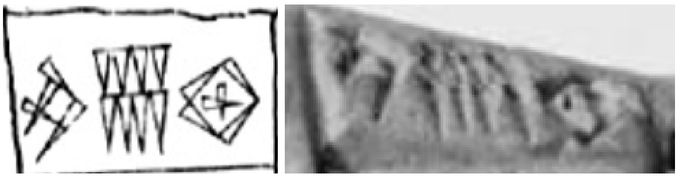


Figure 11: 𒌓𒐍𒄰 “eighth day” in [P220703, rev. 3 1]. Left: Copy from [All08]. Right: [Louvre] photograph.

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

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

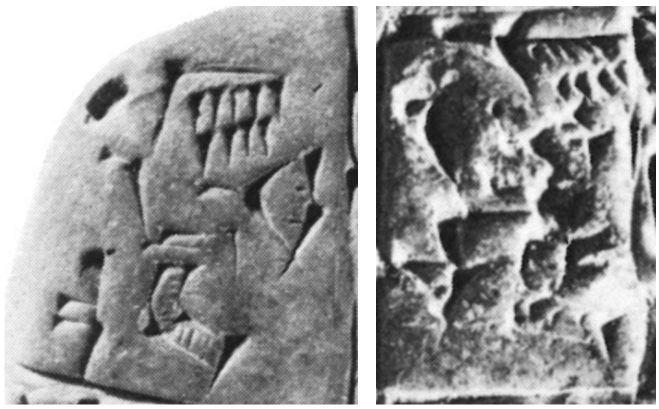


Figure 14: Left: [cuneiform] "9 minas and 51 shekels of silver" in [P241283, *recto* 1 1]; right: [cuneiform] "1 mina and 51 shekels of silver" in [P241325, *verso* 3 2], both from Ebla. Photographs from [EbDA].

3.4 Glyphs

As illustrated in the above figures, the angle of the 𒀹 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, [cuneiform] and [cuneiform] sometimes appear with all wedges in a row in ED IIIa tablets, as in [P010432; 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: 𒐈 in Ur III, 𒑆 in Neo-Assyrian. While 𒀸, 𒁹, and 𒌋 numerals needed to have their stacking patterns disunified for compatibility with [Bor10], this practice should not be extended to Early Dynastic stacking patterns of 𒀸, 𒁹, and 𒌋 numerals, nor to 𒀹 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 𒑚 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 𒑚 series. Two characters already have DISH TENU in their names: U+12483 𒒃 CUNEIFORM SIGN BAD TIMES DISH TENU and U+12543 𒕃 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[19]) 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[20] dated to the reign of 𒂗𒀭𒈾𒁺 (Enanatum) the second, [P222224] to the reign of 𒂗𒋼𒈨𒈾 (Enmetenak[21]), and [P221783] from Lagaš to the reign of 𒂗𒀭𒈾𒁺 the first.

Where attested[22], regnal years beyond the ninth are written differently: 𒌋 for the 10th year of 𒌷𒅗𒄀𒈾 in [P222640], and with subtractive subtraction for the 17th[23] written 𒌋𒌋𒇲𒑜 in [P221483, rev. 4 12] and the 19th year of 𒂗𒋼𒈨𒈾 written 𒌋𒌋𒇲𒑚 in [P221413, rev. 3 3; P222223, rev. 1 2]. The numeral series therefore stops at 𒀸×9𒑚. Figures 15–24 show these numerals used in ancient and modern text.

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

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

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

[22]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 (Lugalzagesi) mean that these are quite rare; see [SS15, p. 71, p. 74 n. 176].

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

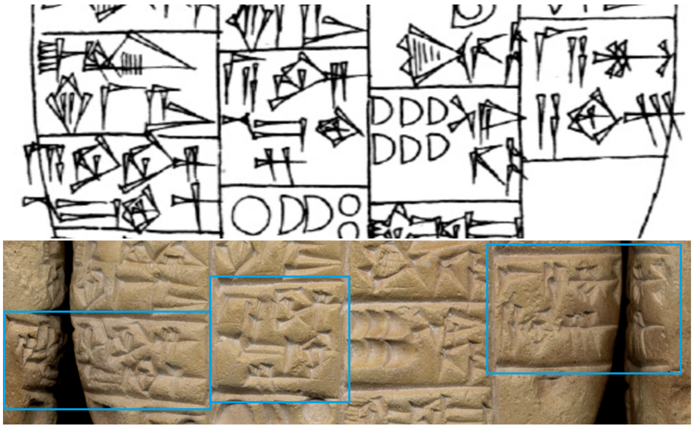
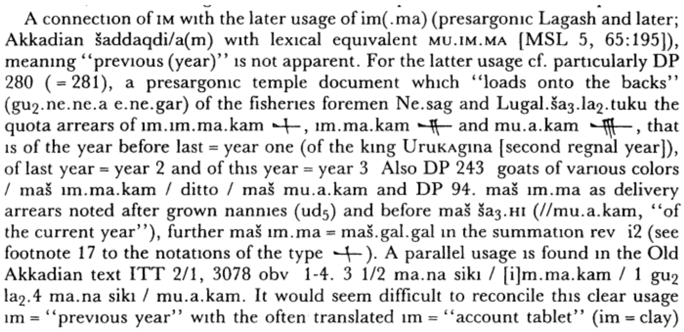


Figure 15: Obverse of [P220930], showing “arrears of the year before last 1 (of the reign of)”, “arrears of last year 2”, “arrears of this year 3”. The arrears in question consist of fish and turtles. Top: Copy from [All08]. Bottom: [CDLI] photograph.



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.

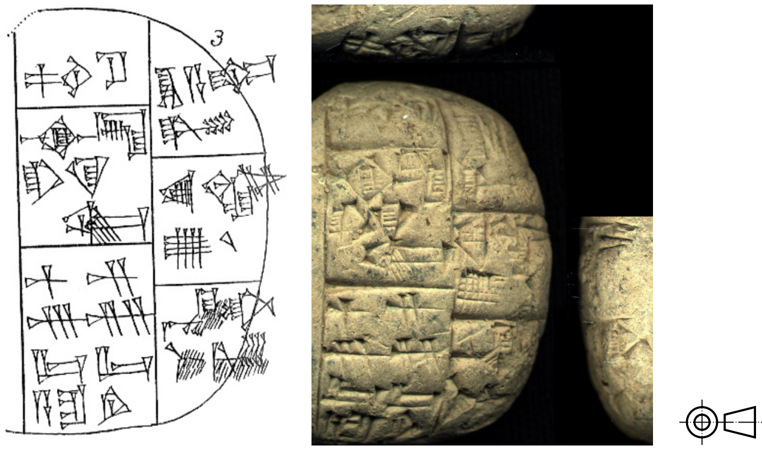


Figure 17: / / / / “Donkey skins property of Enentarzid ensik of Lagaš. (Years) 1 2 3 4 are all put together.” in [P020133, rev. 1 2 sqq.]. Left: Copy from [För16]. Right: [CDLI] photograph.

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.

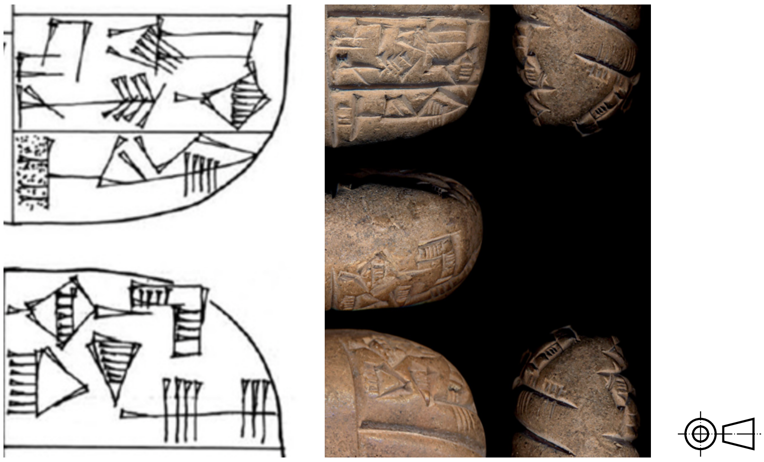


Figure 20: 𒌷𒅎𒆠𒂵𒉌𒈾 / 𒈗𒁀 / 𒉢𒁓𒆷𒆠 / 𒐋 "Irikaginak king of Lagaš, year 7" in [P386436, obv. 2 4 sqq.]. Left: Copy from [Cri10]. Right: [CDLI] photograph.

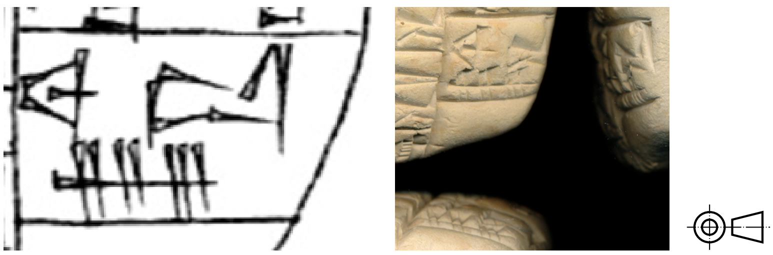


Figure 21: 𒁺𒁺 𒐋 "carried off, (year) 7 (of Lugalanda)" in [P221075, obv. 3 6], dated to the 1st year of 𒌷𒅎𒆠𒂵𒉌𒈾. Left: Copy from [All08]. Right: [CDLI] photograph.

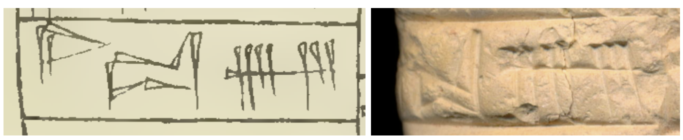


Figure 22: 𒋧𒁺 𒐋 "delivered, (year) 7 (of Lugalanda)" in [P221034, rev. 2 5], dated to the 1st year of 𒌷𒅎𒆠𒂵𒉌𒈾. Left: Copy from [All08]. Right: [CDLI] photograph.

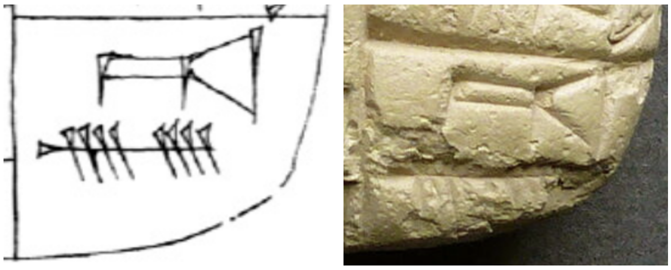


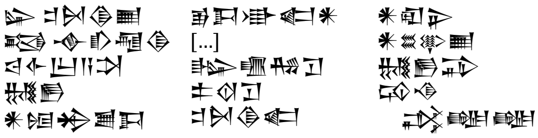
Figure 23: (referencing the year 8 of) in [P222224, obv. 2 4]. Left: Copy from [CHT10]. Right: [Louvre] photograph.

Figure 24: (of) in [P221906, rev. 2 1]. Left: Copy from [Ник08]. Right: [CDLI] photograph.

4.3 Glyphs

The 𒀹 wedges in these numerals are consistently grouped for numbers above : 2-2, 3-2, 3-3, 4-3, 4-4, and 3-3-3. The representative glyphs follow this grouping. 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 , 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 𒈗𒍠𒄀𒋛, 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 latter. Note that U+12483 𒒃 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.

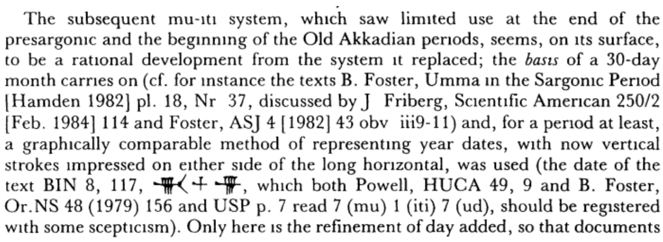

The subsequent mu-iti system, which saw limited use at the end of the presargonic and the beginning of the Old Akkadian periods, seems, on its surface, to be a rational development from the system it replaced; the *basis* of a 30-day month carries on (cf. for instance the texts B. Foster, Umma in the 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, [illegible], 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

Robin Leroy authored the bulk of the text. Roozbeh Pournader (روزبه پورنادر) provided feedback on 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

[P010432] IM 067645. Baghdad, Iraq: المتحف العراقي.
CDLI: P010432.
ORACC: epsd2/P010432.

[P010787] Ist Š 0251. Istanbul, Turkey: İstanbul Arkeoloji Müzeleri.
CDLI: P010787.
ORACC: dccmt/P010787.

[P010896] Ist Š 0752. Istanbul, Turkey: İstanbul Arkeoloji Müzeleri.
CDLI: P010896.
ORACC: epsd2/P010896.

[P010928] Ist Š 0878. Istanbul, Turkey: İstanbul Arkeoloji Müzeleri.
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. Berlin, Germany: Vorderasiatisches Museum.
CDLI: P020133.
ORACC: epsd2/P020133.

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

[P020303] VAT 04852. Berlin, Germany: Vorderasiatisches Museum.
CDLI: P020303.
ORACC: epsd2/P020303.

[P020304] VAT 04855. Berlin, Germany: Vorderasiatisches Museum.
CDLI: P020304.
ORACC: epsd2/P020304.

[P109346] FLP 0558. Philadelphia, Pennsylvania, United States: Free Library of Philadelphia.
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. Cambridge, Massachusetts, United States: Harvard Museum of the Ancient Near East.
CDLI: P221346.
ORACC: epsd2/P221346.

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

[P221483] MLC 01497. New Haven, Connecticut, United States: J. Pierpont Morgan Library Collection, Yale Babylonian Collection.
CDLI: P221483.
ORACC: epsd2/P221483.

[P221534] NBC 05930. New Haven, Connecticut, United States: Nies Babylonian Collection, Yale Babylonian Collection.
CDLI: P221534.
ORACC: epsd2/P221534.

[P221590] CBS 04700. Philadelphia, Pennsylvania, United States: Penn Museum.
CDLI: P221590.
ORACC: epsd2/P221590.

[P221730] Erm 14023. Saint Petersburg, Russia: Государственный Эрмитаж.
CDLI: P221730.
ORACC: epsd2/P221730.

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

[P221906] Erm 14137. Saint Petersburg, Russia: Государственный Эрмитаж.
CDLI: P221906.
ORACC: epsd2/P221906.

[P222006] Erm 14237. Saint Petersburg, Russia: Государственный Эрмитаж.
CDLI: P222006.
ORACC: epsd2/P222006.

[P222129] UM 33-59-029. Philadelphia, Pennsylvania, United States: Penn Museum.
CDLI: P222129.
ORACC: epsd2/P222129.

[P222223] AO 04156. Paris, France: Musée du Louvre.
CDLI: P222223.
ORACC: epsd2/P222223.

[P222224] AO 04155. Paris, France: Musée du Louvre.
CDLI: P222224.
ORACC: epsd2/P222224.
Louvre Collections: ark:/53355/cl010165102.

[P222618] *Lamentation sur la ruine de Lagash*. AO 04162. Paris, France: Musée du Louvre.
CDLI: P222618.
ORACC: epsd2/Q001133.
ORACC: etcsri/Q001133.
Louvre Collections: ark:/53355/cl010120698.

[P222640] AO 00402. Paris, France: Musée du Louvre.
CDLI: P222640.

[P241283] Excavation number TM.75.G.01710.
CDLI: P241283.
EbDA: 1227.

[P241325] Excavation number TM.75.G.01752.
CDLI: P241325.
EbDA: 30.

[P247594] AO 04238. Paris, France: Musée du Louvre.
CDLI: P247594.
ORACC: epsd2/P247594.

[P345960] VAT 09541. Berlin, Germany: Vorderasiatisches Museum.
CDLI: P345960.
ORACC: dcclt/P345960.

[P365233] Accession number DT 040. London, United Kingdom: British Museum.
CDLI: P365233.
ORACC: dcclt/P365233.

[P365267] BM 093068. London, United Kingdom: British Museum.
CDLI: P365267.
ORACC: dcclt/P365267.

[P386436] WML 51.63.036. Liverpool, United Kingdom: World Museum.
CDLI: P386436.
ORACC: epsd2/P386436.

[P391514] OIM A02480. Chicago, Illinois, United States: Institute for the Study of Ancient Cultures, West Asia & North Africa (formerly Oriental Institute) Museum.
CDLI: P391514.
ORACC: dcclt/P391514.

[P452986] MRAH O.5012. Brussels, Belgium: Musées royaux d'Art et d'Histoire.
CDLI: P452986.
ORACC: epsd2/P452986.

ISO and Unicode documents

[ISO5456-2] ISO/TC 10/SC 1. "Orthographic representations – Représentations orthographiques". In: *Technical drawings — Projection methods – Dessins techniques — Méthodes de projection*. 1st ed. ISO 15924-2. 1996.
https://www.iso.org/standard/11502.html.

[L2/12-208] M. Everson, C. Jay Crisostomo and S. Tinney. *Proposal for Early Dynastic Cuneiform*. 13th June 2012.
UTC: L2/12-208.
ISO/IEC JTC 1/SC 2/WG 2: N4278.

[L2/24-210R] R. Leroy, A. Pandey and S. Tinney. *Archaic cuneiform numerals*. 23rd Oct. 2024.
UTC: L2/24-210R.

[L2/24-239] R. Leroy. *Numeric annotations and properties for cuneiform signs*. 25th Oct. 2024.
UTC: L2/24-239.

Online corpora and related projects

[CDLI] É. Pagé-Perron, J. L. Dahl, B. Lafont, J. Renn, R. K. Englund and P. Damerow, eds. *Cuneiform Digital Library Initiative*. 2000–.
https://cdli.mpiwg-berlin.mpg.de.

[DCCLT] N. Veldhuis, S. Tinney, M. Fitzgerald, J. Cooper, J. Peterson, J. W. Carnahan, T. Tanaka and C. Jay Crisostomo, eds. *Digital Corpus of Cuneiform Lexical Texts*. 2003–.
ORACC: dcclt.

[EbDA] L. Milano, M. Maiocchi, F. Di Filippo, R. Orsini, E. Scarpa, M. Surdi et al., eds. *Ebla Digital Archives*. 2007–.
http://ebda.cnr.it/.

[ePSD2] S. Tinney, P. Jones and N. Veldhuis, eds. *The electronic Pennsylvania Sumerian Dictionary*. 2nd ed. 2017–.
http://oracc.org/epsd2.

[ETCSRI] G. Zólyomi, B. Tanos and S. Sövegjártó, eds. *The Electronic Text Corpus of Sumerian Royal Inscriptions*. 2008–.
ORACC: etcsri.

[Louvre] *Site des collections*. Musée du Louvre.
https://collections.louvre.fr/.

[OSL] N. Veldhuis, S. Tinney et al., eds. *Oracc Sign List*. 2014–.
http://oracc.org/osl/.

Other documents

[All08] F.-M. Allotte de la Fuÿe. *Documents présargoniques*. Paris: Ernest Leroux, 1908–1920.

[Arc15] A. Archi. *Ebla and Its Archives. Texts, History, and Society*. Studies in ancient Near Eastern records 7. Walter de Gruyter, 2015.
ISBN: 978-1-61451-716-0.
DOI: 10.1515/9781614517887.

[Bor10] R. Borger. *Mesopotamisches Zeichenlexikon*. Alter Orient und Altes Testament 305. Ugarit-Verlag, 2010.

[CHT10] G. Cros, L. Heuzey and F. Thureau-Dangin. *Nouvelles fouilles de Tello*. Mission française de Chaldée. Paris: Ernest Leroux, 1910.

[Cri10] E. L. Cripps. *Sargonic and Presargonic Texts in the World Museum Liverpool*. BAR International Series 2135. Oxford: Archaeopress, 2010.

[Eng88] R. K. Englund. "Administrative Timekeeping in Ancient Mesopotamia". In: *Journal of the Economic and Social History of the Orient* 31.2 (1988).

[För16] W. Förtsch. *Altbabylonische Wirtschaftstexte aus der Zeit Lugalanda's und Urukagina's*. Vorderasiatische Schriftdenkmäler der Königlichen Museen zu Berlin 14. J. C. Hinrichs, 1916.

[Gon00] Y. Gong. *Die Namen der Keilschriftzeichen*. Alter Orient und Altes Testament 268. Ugarit-Verlag, 2000.

[Gon03] Y. Gong. "The Names of Cuneiform Signs". In: *Journal of Ancient Civilizations* 18 (2003), pp. 1–22.

[Gon93] Y. Gong. *Studien zur Bildung und Entwicklung der Keilschriftzeichen*. Antiquates 7. Verlag Dr. Kovač, 1993.

[Gor23] F. Gori. "On Lapis Lazuli and Linen in Šuruppag Texts. An Analysis Through the Lens of Ebla Studies". In: *Studia Eblaitica* 9 (2023), pp. 160–166. ISSN: 2364-7124.

[Gor24] F. Gori. "Numeracy in Early Syro-Mesopotamia. A study of accounting practices from Fāra to Ebla". PhD thesis. Università degli studi di Verona, 2024.
https://iris.univr.it/bitstream/11562/1114808/1/Diss_Fiammetta_Gori.pdf.

[Gre22] A. Greco. "An Archive of Pasture Plots from Ur-III Ĝirsu". In: *Cuneiform Digital Library Journal* 2021.2 (24th Jan. 2022). ISSN: 1540-8779.
https://cdli.ucla.edu/pubs/cdlj/2021/cdlj2021_002.html.

[Lec16] C. Lecompte. "ED IIIb metrology: texts from Lagaš". In: *CDLI:wiki. A Library of Knowledge of the Cuneiform Digital Library Initiative*. 12th Apr. 2016.
https://cdli.ox.ac.uk/wiki/doku.php?id=ed_iii_metrological_systems.

[Lec20] C. Lecompte. "The Measurement of Fields During the Pre-sargonic Period". In: *Mathematics, Administrative and Economic Activities in Ancient Worlds*. Ed. by C. Michel and K. Chemla. Why the Sciences of the Ancient World Matter 5. Springer, 2020. Chap. 8, pp. 283–344.

[Mar91] J. Marzahn. *Altbabylonische Wirtschaftstexte aus der Zeit Lugalanda's und Urukagina's*. Vorderasiatische Schriftdenkmäler Der Staatlichen Museen Zu Berlin 25. J. C. Hinrichs, 1991.

[Mit06] C. Mittermayer. *Altbabylonische Zeichenliste der sumerisch-literarischen Texte*. 2006.
DOI: 10.5167/uzh-156871.

[MPVW01] H. Martin, F. Pomponio, G. Visicato and A. Westenholz. *The Fara Tablets in the University of Pennsylvania Museum of Archaeology and Anthropology*. CDL Press, 2001.

[Pow87] M. Powell. "Maße und Gewichte". In: *Reallexikon der Assyriologie und vorderasiatischen Archäologie*. Ed. by D. O. Edzard. Vol. 7 Libanukšabaš–Medizin. 1987–1990, pp. 457–530.

[Rob08] E. Robson. *Mathematics in Ancient Iraq. A Social History*. Princeton University Press, 2008.
ISBN: 978-0-691-09182-2.

[Rob22] E. Robson. "Overview of Metrological Systems". In: *The Digital Corpus of Cuneiform Mathematical Texts*. 2022.
ORACC: dccmt/Metrology.

[Sch35] N. Schneider. *Die Keilschriftzeichen der Wirtschaftsurkunden von Ur III*. Editrice Pontificio Istituto Biblico, 1935.

[SS15] W. Sallaberger and I. Schrakamp. "Philological data for a historical chronology of Mesopotamia in the 3rd millennium". In: *History & philology*. Ed. by W. Sallaberger and I. Schrakamp. ARCANE: associated regional chronologies for the ancient Near East and the Eastern Mediterranean 3. 2015. Chap. 1, pp. 1–136.

[Van21] S. Vanséveren. *Unicode Cuneiform*. 10th Sept. 2021. http://hethiter.net/cuneifont.

[Wes75] A. Westenholz. *Literary and Lexical Texts and the Earliest Administrative documents*. Old Sumerian and Old Akkadian Texts in Philadelphia Chiefly from Nippur 1. 1975.

[Ник08] М. В. Никольскій. “Документы хозяйственной отчетности древнѣйшей эпохи Халдеи изъ собранія Н. П. Лихачева”. In: *Древности Восточныя. Труды Восточной Коммиссіи Императорскаго Московскаго Археологическаго Общества*. Vol. 3.2. Санктъ-Петербургъ, 1908.

ISO/IEC JTC 1/SC 2/WG 2
PROPOSAL SUMMARY FORM TO ACCOMPANY SUBMISSIONS
FOR ADDITIONS TO THE REPERTOIRE OF ISO/IEC 10646[1]
Please fill all the sections A, B and C below.
Please read Principles and Procedures Document (P & P) from http://std.dkuug.dk/JTC1/SC2/WG2/docs/principles.html **for guidelines and details before filling this form.**
Please ensure you are using the latest Form from http://std.dkuug.dk/JTC1/SC2/WG2/docs/summaryform.html **.**
See also http://std.dkuug.dk/JTC1/SC2/WG2/docs/roadmaps.html **for latest *Roadmaps*.**

A. Administrative

1. **Title:** ***Twelve cuneiform* tenû *numerals***
2. Requester's name: *Robin Leroy*
3. Requester type (Member body/Liaison/Individual contribution): *Individual contribution*
4. Submission date: *2024-12-16*
5. Requester's reference (if applicable):
6. Choose one of the following:
   This is a complete proposal: *YES*
   (or) More information will be provided later:

B. Technical – General

1. Choose one of the following:
   a. This proposal is for a new script (set of characters):
      Proposed name of script:
   b. The proposal is for addition of character(s) to an existing block: *YES*
      Name of the existing block: *Cuneiform Numbers and Punctuation*
2. Number of characters in proposal:
3. Proposed category (select one from below - see section 2.2 of P&P document):

A-Contemporary		B.1-Specialized (small collection)		B.2-Specialized (large collection)	
C-Major extinct		D-Attested extinct		E-Minor extinct	
F-Archaic Hieroglyphic or Ideographic	X			G-Obscure or questionable usage symbols	

4. Is a repertoire including character names provided? *YES*
   a. If YES, are the names in accordance with the "character naming guidelines" in Annex L of P&P document? *YES*
   b. Are the character shapes attached in a legible form suitable for review? *YES*
5. Fonts related:
   a. Who will provide the appropriate computerized font to the Project Editor of 10646 for publishing the standard?
   Robin Leroy
   b. Identify the party granting a license for use of the font by the editors (include address, e-mail, ftp-site, etc.):
   Robin Leroy (eggrobin@unicode.org)
6. References:
   a. Are references (to other character sets, dictionaries, descriptive texts etc.) provided? *YES*
   b. Are published examples of use (such as samples from newspapers, magazines, or other sources) of proposed characters attached? *YES*
7. Special encoding issues:
   Does the proposal address other aspects of character data processing (if applicable) such as input, presentation, sorting, searching, indexing, transliteration etc. (if yes please enclose information)? *YES*

8. Additional Information:

Submitters are invited to provide any additional information about Properties of the proposed Character(s) or Script that will assist in correct understanding of and correct linguistic processing of the proposed character(s) or script. Examples of such properties are: Casing information, Numeric information, Currency information, Display behaviour information such as line breaks, widths etc., Combining behaviour, Spacing behaviour, Directional behaviour, Default Collation behaviour, relevance in Mark Up contexts, Compatibility equivalence and other Unicode normalization related information. See the Unicode standard at http://www.unicode.org for such information on other scripts. Also see Unicode Character Database (http://www.unicode.org/reports/tr44/) and associated Unicode Technical Reports for information needed for consideration by the Unicode Technical Committee for inclusion in the Unicode Standard.

[1] Form number: N4502-F (Original 1994-10-14; Revised 1995-01, 1995-04, 1996-04, 1996-08, 1999-03, 2001-05, 2001-09, 2003-11, 2005-01, 2005-09, 2005-10, 2007-03, 2008-05, 2009-11, 2011-03, 2012-01)

C. Technical - Justification

1. Has this proposal for addition of character(s) been submitted before? *NO*
   If YES explain
2. Has contact been made to members of the user community (for example: National Body, user groups of the script or characters, other experts, etc.)? *YES*
   If YES, with whom? *Karljürgen Feuerherm, Erica Scarpa, and Steve Tinney.*
   If YES, available relevant documents: *This document.*
3. Information on the user community for the proposed characters (for example: size, demographics, information technology use, or publishing use) is included? *YES*
   Reference: *This document.*
4. The context of use for the proposed characters (type of use; common or rare) *rare*
   Reference:
5. Are the proposed characters in current use by the user community? YES
   If YES, where? Reference: *Scholarly publications. This document.*
6. After giving due considerations to the principles in the P&P document must the proposed characters be entirely in the BMP? *NO*
   If YES, is a rationale provided?
   If YES, reference:
7. Should the proposed characters be kept together in a contiguous range (rather than being scattered)?
8. Can any of the proposed characters be considered a presentation form of an existing character or character sequence? *NO*
   If YES, is a rationale for its inclusion provided?
   If YES, reference:
9. Can any of the proposed characters be encoded using a composed character sequence of either existing characters or other proposed characters? *NO*
   If YES, is a rationale for its inclusion provided?
   If YES, reference:
10. Can any of the proposed character(s) be considered to be similar (in appearance or function) to, or could be confused with, an existing character? *NO*
    If YES, is a rationale for its inclusion provided?
    If YES, reference:
11. Does the proposal include use of combining characters and/or use of composite sequences? *NO*
    If YES, is a rationale for such use provided?
    If YES, reference:
    Is a list of composite sequences and their corresponding glyph images (graphic symbols) provided?
    If YES, reference:
12. Does the proposal contain characters with any special properties such as control function or similar semantics? *NO*
    If YES, describe in detail (include attachment if necessary)
13. Does the proposal contain any Ideographic compatibility characters? *NO*
    If YES, are the equivalent corresponding unified ideographic characters identified?
    If YES, reference: