

Twelve cuneiform *tenû* numerals

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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, $7\text{↖}^1-9\text{↖}$, where $1↖ = ↖$ through $6↖ = \nwarrow$ are already encoded. Their glyptic range and usage are discussed in §3. The other proposed characters constitute a new series of numerals, formed by ↖ numerals crossing an — wedge. They are discussed in §4.

These characters are extensively used in Early Dynastic administrative corpus, which is published online² 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.

¹We 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 3↖ for both 3(bur₃) and 3(u), rather than 30↖ for the latter.

²See, 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 ፩ cuneiform sign dish
 → 1222B ፪ cuneiform sign min
 → 12559 ፻ 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 bur₃
 → 1230B ፲ cuneiform sign u
 → 12399 ፳ cuneiform sign u u
 → 1230D ፳ cuneiform sign u u u
 → 12565 ፳; cuneiform numeric sign four n14
 → 12659 ፳; 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 GESU
 → 12574 □ cuneiform numeric sign one n48
- 1241F ⚫ CUNEIFORM NUMERIC SIGN TWO GESU
 12420 ⚫ CUNEIFORM NUMERIC SIGN THREE GESU
 12421 ⚫ CUNEIFORM NUMERIC SIGN FOUR GESU
 12422 ⚫ CUNEIFORM NUMERIC SIGN FIVE GESU
 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 tenū
 → 12039 ḫ 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 Lagash.

- 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;N1;0;L;;;;7;N;;;;;
12475;CUNEIFORM NUMERIC SIGN EIGHT ASH TENU;N1;0;L;;;;8;N;;;;;
12476;CUNEIFORM NUMERIC SIGN NINE ASH TENU;N1;0;L;;;;9;N;;;;;
12477;CUNEIFORM NUMERIC SIGN ASH TIMES ONE DISH TENU;N1;0;L;;;;1;N;;;;;
12478;CUNEIFORM NUMERIC SIGN ASH TIMES TWO DISH TENU;N1;0;L;;;;2;N;;;;;
12479;CUNEIFORM NUMERIC SIGN ASH TIMES THREE DISH TENU;N1;0;L;;;;3;N;;;;;
1247A;CUNEIFORM NUMERIC SIGN ASH TIMES FOUR DISH TENU;N1;0;L;;;;4;N;;;;;
1247B;CUNEIFORM NUMERIC SIGN ASH TIMES FIVE DISH TENU;N1;0;L;;;;5;N;;;;;
1247C;CUNEIFORM NUMERIC SIGN ASH TIMES SIX DISH TENU;N1;0;L;;;;6;N;;;;;
1247D;CUNEIFORM NUMERIC SIGN ASH TIMES SEVEN DISH TENU;N1;0;L;;;;7;N;;;;;
1247E;CUNEIFORM NUMERIC SIGN ASH TIMES EIGHT DISH TENU;N1;0;L;;;;8;N;;;;;
1247F;CUNEIFORM NUMERIC SIGN ASH TIMES NINE DISH TENU;N1;0;L;;;;9;N;;;;;
```

2.3.2 Line_Break

Attached: [LineBreak.txt](#).

```
1246F ; AL # N1 CUNEIFORM NUMERIC SIGN SEVEN ASH TENU
12475..1247F ; AL # N1 [11] CUNEIFORM NUMERIC SIGN EIGHT ASH TENU..CUNEIFORM NUMERIC SIGN
 ↳ ASH TIMES NINE DISH TENU
```

2.3.3 Script

Attached: [Scripts.txt](#).

```
1246F ; Cuneiform # N1 CUNEIFORM NUMERIC SIGN SEVEN ASH TENU
12475..1247F ; Cuneiform # N1 [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  series are named U+12039  CUNEIFORM SIGN ASH ZIDA TENU for the first one and U+1244A–U+1244E  CUNEIFORM NUMERIC SIGN *n* ASH TENU for the others.

Some³ 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,

³Besides *tenû*, the terms *gunû* “speckled” (with wedges), *nutillû* “unfinished”, and *šešsig* (filled with  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.; *Gono*, pp. 32 sqq.; *Gono*3, pp. 12 sq.] is used to describe slanted signs or parts of signs: thus 𒆷 is described as 𒆷 *tenû* in [P365233, rev. 1 46']⁴, 𒆷 as 𒆷 *tenû* in [P391514, rev. 2 47] and as 𒆷 *tenû* [obv. 2 80] P467315, 𒆷 as 𒆷 *tenû* in [P391514, 2 33], 𒆷 as 𒆷 (containing) — *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 𒉗 *gab₂* “left” and 𒉗 *zid* “right” respectively, are used in [P345960], which contrasts 𒆷 described as *kaba tenû* and 𒆷 described as *zida tenû*.

In modern transliteration, ፩ numerals are described as — *tenû* (ATF: *asz@t*) or ፪ *tenû* (ATF: *disz@t*), the latter being the norm in [CDLI] transliterations⁶. 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 r^7 lal⁸, as well as for ordinals⁹ and for ages of animals in years¹⁰.

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

⁵These descriptions also spell out the names of the component signs; as today, they are named after one of their values: 纳 tenū is written ଗାନାତେନୁୟୁ ga-na te-nu-u₂ after the value gan₂, 田 tenū as ଶେତେନୁୟୁ še te-nu-u after the value še₃. As today, these names are not unique, see [Gonoo, pp. 52 sqq.; Gonoo3, pp. 17 sqq.], with, e.g., 𠮩 being known today as NINDA, GAR (its character name), and NIG₂, and by the scribes as ନିନ୍ଦାକୁ nin-da-ku, ଆରାକୁ aa-ra-ku, and ନିଂଗୁ ni-ia.

⁶For an example of a transliteration using *as* tenū, see [Gre22, §5.1.8 rev. 14]; note that only the HTML version uses *as* tenū, the PDF uses *dīs*.

⁸Also transliterated la₂, as in [CDLI]. In the transliterated Ur III corpus on [CDLI], out of 3304 occurrences of (disz@t), 1971 are in ḫ n\ la₂ n(disz@t).

⁹1583 out of 3304 occurrences are $n \setminus \Theta n$ (disz@t)-kam, including 647 after ▶

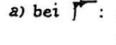
¹⁰ 203 occurrences of gu4, ab2, ansze, or dur3 $n(\text{disz@t})$

¹¹Of 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 *K*.

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a) DIE SCHIEFEN KEILE UND DIE WINKELHAKEN (für die Einheiten von 1-9, neben den senkrechten keilförmigen Zahlenzeichen).

a) bei : RTC. 276: 
 Bart. III 118, 249: 3 gín igi- λ -gál  še.
 Legr. TRU. 310: ud- kam.
 Gen. TD. 5487:  áb.

b) vor kam und àm:
 Bart. III 152, 398: dub--ám
 Legr. TRU. 42: a-du--kam
 a-du -kam
 a-du -kam
 a-du -kam
 Legr. TRU. 346: 1 maš-gal-še -kam-uš
 i udu-še -kam-uš

Siehe: itu-šu--ša; itu šu--ša; itu šu--ša.
 c) nach gud, áb, anše, zur Bezeichnung des Alters.
 ITT. III, II 4956: 20 áb--še 3 qa-ta
 ITT. III, II 6090: 3 anše-sal-; 1 anše-nita 
 Pinch. AT.I. 53: 3 gud ; 1 áb 
 Bart. III 106, 191: 3 anše-nita 
 ITT. II, I. 6965: 20 zu-gud- 15 zu-gud .

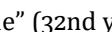
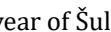
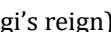
Figure 1: [Sch35, p. 135]

b) GEBRAUCH VON .

ITT. IV. 7164 a:  = 20 minus 3 = 17.
 CT. 10, 24964:  = 40 minus 4 = 36.
 Gen. TE0.5670:  = 240 minus 2 = 238.

Nota: Pgl. im römischen Zahlen-
 system: IX = XminusI; XIX-
 XXminusI; ferner die la-
 teinischen Ausdrücke:
 undeviginti = 20 minus 1; duodetri-
 ginta = 30 minus 2.

Figure 2: [Sch35, p. 132]

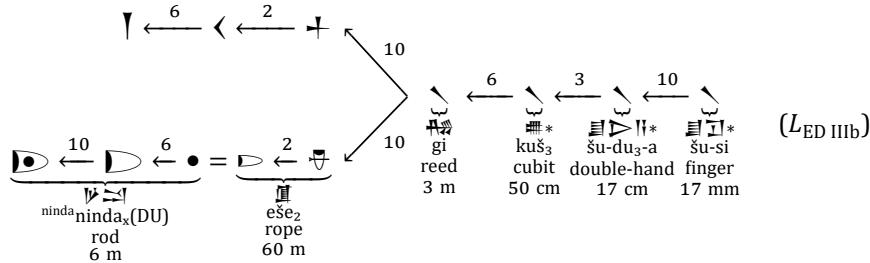
"year Simurrum was destroyed for the third time" (32nd year of Šulgi's reign), or
      mu si-mu-ru-um^{ki} u₃
 lu-lu-bu-um^{ki} a-ra₂ 1 lal 1 λ -kam-aš ba-ḥul "year Simurrum and Lullubum were destroyed for the ninth time" (44th year of Šulgi's reign). Larger ordinals are frequent, in particular for the day of the month, but these are written with λ numerals, thus  for "the 7th day" or  for "the 28th day".

The rarity of the higher λ numerals in the Ur III corpus likely explains the absence of 7 λ -9 λ 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], λ 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 $\text{I} \leftarrow \text{C} \leftarrow \text{+} = 2 \frac{\text{reed}}{\text{cubit}}$, lengths above $1 \frac{\text{reed}}{\text{cubit}}$ are only expressed in I , or equivalently in tens of I , and in half- I equal to $10 \frac{\text{reed}}{\text{cubit}}$. We can therefore expect 7–9 $\frac{\text{reed}}{\text{cubit}}$ to occur, expressed using \nwarrow numerals. Indeed, 37 texts in the transliterated ED IIIb corpus on [CDLI] contain undamaged attestations of either $\frac{\text{reed}}{\text{cubit}}$ or $\frac{\text{reed}}{\text{cubit}}^2$ ¹³; some of these attestations are shown in Figures 3–6. However, $\frac{\text{reed}}{\text{cubit}}^3$ is not attested, since instead subtractive notation is used, as in $\text{DDD} \otimes \text{---} \text{---}$ in [P020129, obv. 3 3], $\text{D} \otimes \text{---} \text{---} \text{---} \text{---}$ in [P221272, rev. 2 2], or $\text{---} \text{---} \text{---}$ in [P020304, obv. 3 8].

A similar situation occurs in some systems of capacity with \nwarrow numerals counting I sila₃, so that $\text{I} \leftarrow \text{I}$ and $\text{I} \leftarrow \text{I} \leftarrow \text{I}$ are attested, see Figures 7 and 8.

The use of \nwarrow 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 frequent¹⁴. In these numbers. We therefore find attestations of $\text{---} - \text{---}$ in “nth day”, some of which are shown in Figures 9–13.

In Ebla, the \nwarrow 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, \nwarrow numerals remain used for large subtrahends, thus [Gor24, p. 101 n. 355] cites occurrences of $\text{---} \text{---} \text{---}$ for 36 and $\text{---} \text{---} \text{---} \text{---} \text{---}$ for 94. In particular, [Gor24, pp. 129 sq.] cites occurrences of $\text{---} 9 \nwarrow$ in Ebla, shown in Figure 14.

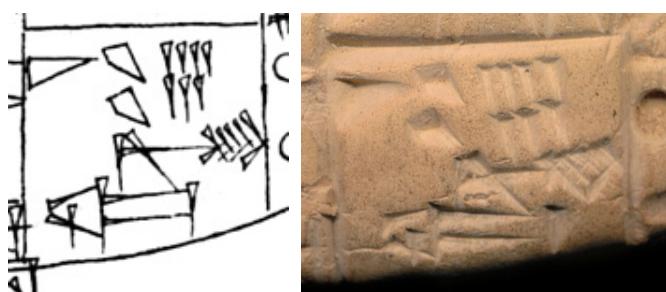


Figure 3: $\text{I} \leftarrow \text{---} \text{---} \text{---}$ “501 m (first) width” (of a field) in [P221254, obv. 3 7] from ED IIIb Nirsu. Left: Copy from [Allo8]. Right: [CDLI] photograph.

¹³Of those, 34 have $\frac{\text{reed}}{\text{cubit}}$ and 9 have $\frac{\text{reed}}{\text{cubit}}^2$.

¹⁴Although also attested, see, e.g., [P221346, rev. 3 6] $\text{---} \text{---} \text{---}$, [P221006, rev. 2 1] $\text{---} \text{---} \text{---}$, [P221272, rev. 2 2] $\text{---} \text{---} \text{---}$.

¹⁵Recall that $\text{---} \text{---}$ mi-at is Eblaite for “hundred”, see [Arc15, p. 33; L2/24-210R, p. 27].

¹⁶The \nwarrow numeral here has trapezoidal stylus impressions, rather than the right-angled triangle typical

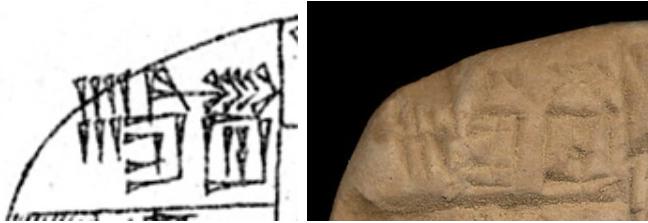


Figure 4: “21 m of reed-bed dyke” (attributed to the farmer) in [P221266, obv. 1 1] from ED IIIb Nirsu. Left: Copy from [Allo8]. Right: [Louvre] photograph.



Figure 5: “1344 m, its height 2 m” (dimensions of a dyke on the river in [Po20303, obv. 2 2] from ED IIIb Nirsu. 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 glyptic 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.

¹⁷This sign contains some hatching (or). A contrast is made in [Mito6] between SUKUD (containing) and GALAM It is unclear at this time whether this should be addressed in the encoding.



Figure 6: “444 m equal widths” (of a field) in [P221254, obv. 1 2]. Left: Copy from [Allo8]. Right: [CDLI] photograph.

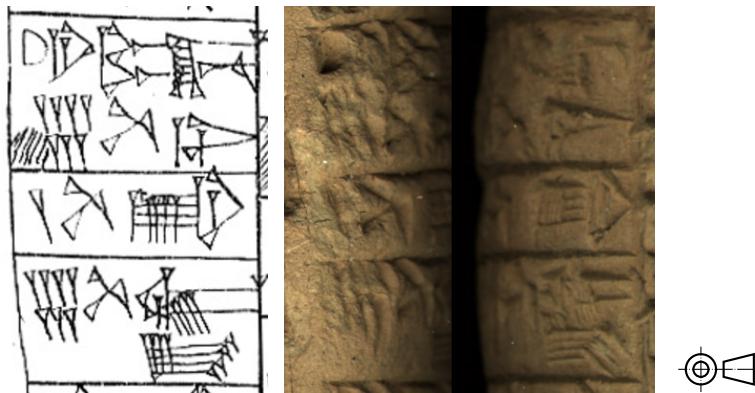


Figure 7: / / “1 ninjbanda 7 sila of butter, 1 sila of cream, 7 sila of dates” in [Po20182, rev. 3 5-7] from ED IIIb Nirsu. Left: Copy from [För16]. Right: [CDLI] photograph¹⁸.



Figure 8: / “8 sila of butter, 8 sila of dates” in [P221730, rev. 2 5-6] from ED IIIb Nirsu. Left: Copy from [Нико8]. Right: [CDLI] photograph.

¹⁸Where 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].

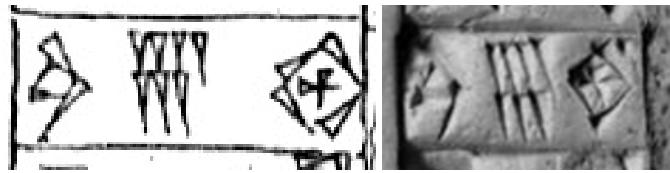


Figure 9:   “seventh day” in [P220703, rev. 2 7] from ED IIIb Nirsu. Left: Copy from [Allo8]. Right: [Louvre] photograph.



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 [Allo8]. Right: [Louvre] photograph.



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

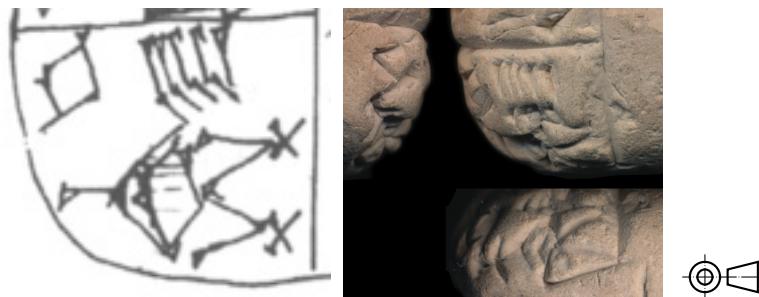


Figure 13: “ninth day” in [P222129, obv. 1 2] from ED IIIa Šuruppag. Left: Copy from [MPVW01]. Right: [CDLI] photograph.

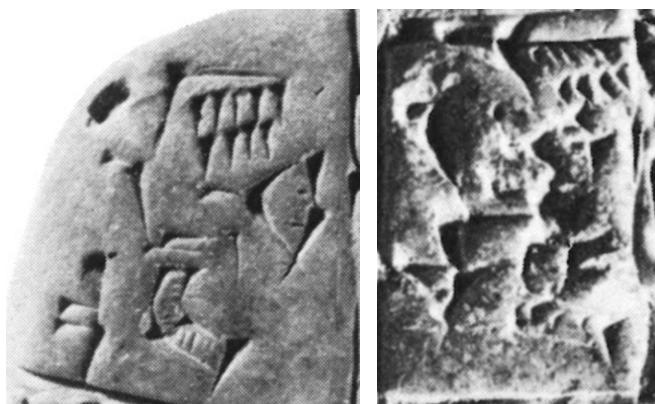


Figure 14: Left: “9 minas and 51 shekels of silver” in [P241283, recto 1 1]; right: “1 mina and 51 shekels of silver” in [P241325, verso 3 2], both from Ebla. Photographs from [EbDA].

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 [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: 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 𒀸 CUNEIFORM NUMERIC SIGN ASH TIMES ONE DISH TENU
- U+12478 𒀸 CUNEIFORM NUMERIC SIGN ASH TIMES TWO DISH TENU
- U+12479 𒀸 CUNEIFORM NUMERIC SIGN ASH TIMES THREE DISH TENU
- U+1247A .abspath{AŠ} CUNEIFORM NUMERIC SIGN ASH TIMES FOUR DISH TENU
- U+1247B .abspath{AŠ} CUNEIFORM NUMERIC SIGN ASH TIMES FIVE DISH TENU
- U+1247C .abspath{AŠ} CUNEIFORM NUMERIC SIGN ASH TIMES SIX DISH TENU
- U+1247D .abspath{AŠ} CUNEIFORM NUMERIC SIGN ASH TIMES SEVEN DISH TENU
- U+1247E .abspath{AŠ} CUNEIFORM NUMERIC SIGN ASH TIMES EIGHT DISH TENU
- U+1247F .abspath{AŠ} 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 \nwarrow numeral. Their ATF name is $n(|ASZ\times DISZ@t|)$, as ATF numerals are of the form $n(\langle\text{name}\rangle)$. 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 \nwarrow series. Two characters already have DISH TENU in their names: U+12483 𒀸 CUNEIFORM SIGN BAD TIMES DISH TENU and U+12543 𒁶 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 ($|ASZ\times DISZ@t|$) in the current transliterated [CDLI] corpus. Almost all attestations are from Nirsu, and most of them are in regnal years of 𒉩 𒀭 𒄑 𒀭 (Irikaginak¹⁹) and his predecessor 𒉩 𒀭 𒊩 (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 𒉩 𒀭 𒂗 (Enentarzid), [P247594] possibly²⁰ dated to the reign of 𒉩 𒀭 𒂗 (Enanatum) the second, [P222224] to the reign of 𒉩 𒀭 𒂗 (Enmetenak²¹), and [P221783] from Lagaš to the reign of 𒉩 𒀭 𒂗 the first.

Where attested²², regnal years beyond the ninth are written differently: 𒉩 for the 10th year of 𒉩 𒀭 𒄑 𒀭 in [P222640], and with subtractive subtraction for the 17th²³ written 𒉩 𒉩 in [P221483, rev. 4 12] and the 19th year of 𒉩 𒉩 𒂗 written 𒉩 𒉩 in [P221413, rev. 3 3; P222223, rev. 1 2]. The numeral series therefore stops at —×9 \nwarrow . Figures 15–24 show these numerals used in ancient and modern text.

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

²⁰Dated instead to the reign of 𒉩 𒀭 𒄑 𒀭 by [SS15, p. 70].

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

²²The length of the reign of 𒉩 𒀭 𒊩 (6 years and 1 month) and the dearth of documents dated to the reign of 𒉩 𒀭 𒄑 𒀭 after his defeat by 𒉩 𒉩 𒂗 (Lugalzagesi) mean that these are quite rare; see [SS15, p. 71, p. 74 n. 176].

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

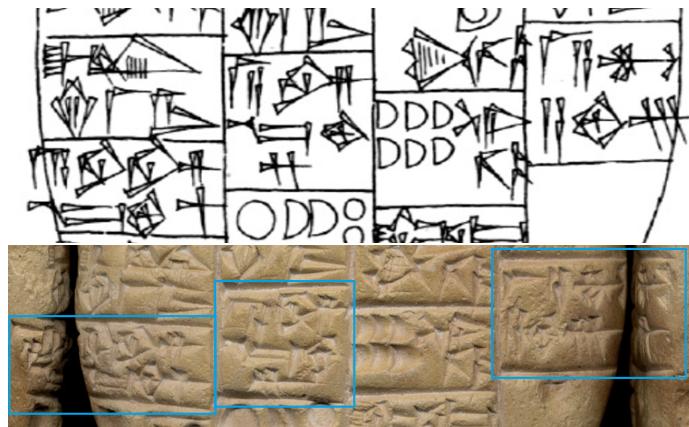


Figure 15: Obverse of [P220930], showing 𠂔 𠂔 𠂔 𠂔 “arrears of the year before last 1 (of the reign of 𠁷 𠁷 𠁷 𠁷)”, 𠂔 𠂔 𠂔 𠂔 “arrears of last year 2”, 𠂔 𠂔 𠂔 𠂔 “arrears of this year 3”. The arrears in question consist of fish and turtles. Top: Copy from [Allo8]. Bottom: [CDLI] photograph.

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.ša₃.la₂.tuku the quota arrears of im.im.ma.kam 𠂔, im.ma.kam 𠂔 and mu.a.kam 𠂔, 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 (ud₅) and before maš ša₃.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 𠂔). 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 gu₂ la₂.4 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 𠂔 notation for year names in [Eng88, p. 166 n. 37], referring to [P220930]. See Figure 15.

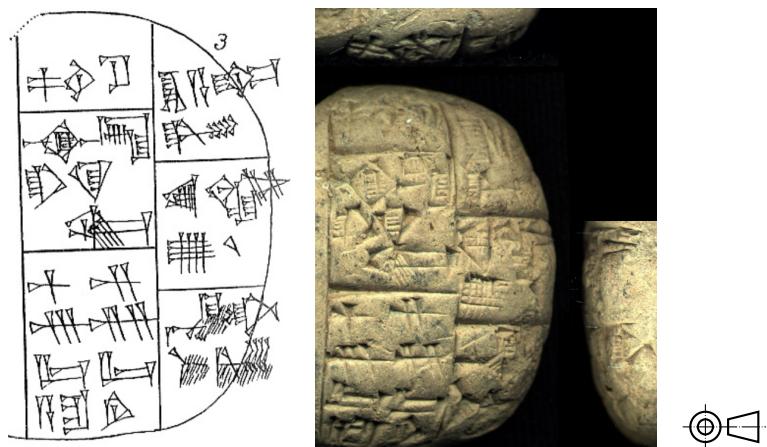


Figure 17:   /   /   /           “Donkey skins property of Enentarzid ensik of Lagaš. (Years) 1 2 3 4 are all put together.” in [P020133, rev. 12 sqq.]. Left: Copy from [För16]. Right: [CDLI] photograph.



Figure 18:     “Silver payment 5th and 6th (years of Lugaland)” in [P221169, rev. 3 2], dated to the 1st year of     . Left: Copy from [Allo8]. Right: [CDLI] photograph.



Figure 19:  (of    ) in [P222006, obv. 2 3]. Left: Copy from [Нико8]. Right: [CDLI] photograph.

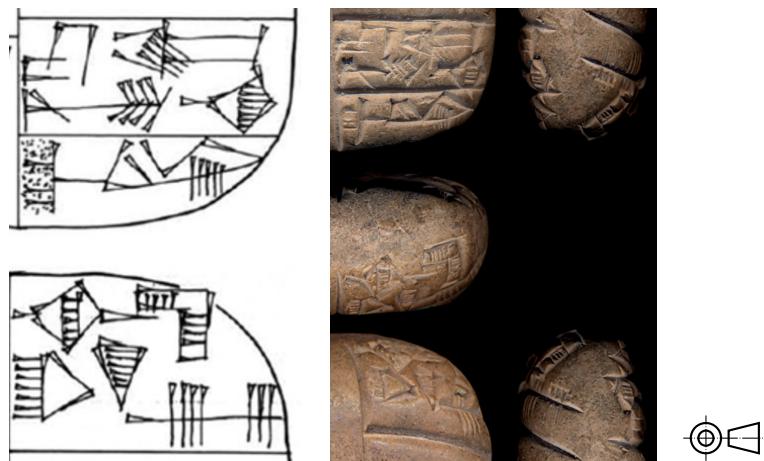


Figure 20: / / / “Irikaginak king of Lagaš, year 7” in [P386436, obv. 2 4 sqq.]. Left: Copy from [Cri10]. Right: [CDLI] photograph.



Figure 21: “carried off, (year) 7 (of Lugaland)” in [P221075, obv. 3 6], dated to the 1st year of . Left: Copy from [Allo8]. Right: [CDLI] photograph.

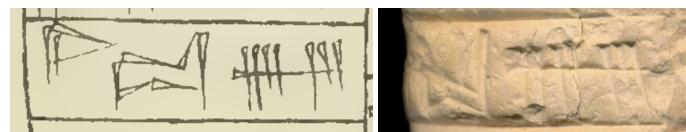


Figure 22: “delivered, (year) 7 (of Lugaland)” in [P221034, rev. 2 5], dated to the 1st year of . Left: Copy from [Allo8]. Right: [CDLI] photograph.

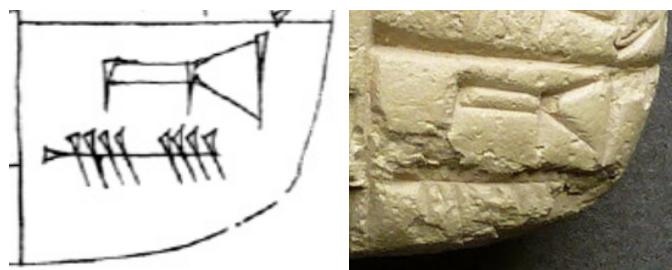


Figure 23: (referencing the year 8 of in [P222224, obv. 2 4]). Left: Copy from [CHT10]. Right: [Louvre] photograph.



Figure 24: (of) in [P221906, rev. 2 1]. Left: Copy from [Нико8]. Right: [CDLI] photograph.

4.3 Glyphs

4.4 Later usage



Having raided Lagaš, the leader of Umma surely committed a sin against Ninjirsu! [...] 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 𒆜 𒈗 𒉢 𒈗 𒉣, sometimes involving numerals of the form 𒉡 < 𒉢 >. These numerals are less comprehensively attested, and their interpretation is sometimes still unclear, see Figure 25. The co-occurrence and likely contrast of 𒉡 < 𒉢 > and 𒉢 < 𒉢 > in [P221534] may preclude treating the former as a stylistic variant of the latter. Note that U+12483 ✕ CUNEIFORM SIGN BAD TIMES DISH TENU is already encoded as a non-numeric character, and should be used for 1(𒉡 < 𒉢 >) if needed. These 𒉡 < 𒉢 > numerals are not being proposed at this time.

The subsequent mu-itī 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, 𒉡 < 𒉢 >, 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: [etcstri/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 0.5012. 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

- [Allo8] 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](https://doi.org/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.
- [Gonoo] 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](https://doi.org/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.
- [Нико8] М. В. Никольский. “Документы хозяйственной отчетности древнейшей эпохи Халдеи изъ собрания Н. П. Лихачева”. In: *Древности Восточныя. Труды Восточной Комиссии Императорского Московского Археологического Общества*. Vol. 3.2. Санкт-Петербургъ, 1908.