

Archaic cuneiform numerals

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1 Summary

This document proposes encoding, at U+12550–U+12586, 311 numerals used in the fourth millennium (Uruk IV and Uruk III periods) and Early Dynastic period in conjunction with the Sumero-Akkadian cuneiform script¹ and the proto-cuneiform script². The proposed characters are listed in §2. Most of them were listed in [L2/23-190]. The present document provides a more detailed rationale for their encoding and additional information about their identity and usage, both as part of the rationale and in §5. Some characters have been removed, in some cases because they are non-encodable variants, in others because their encodability should be considered as part of the proto-cuneiform proposal; these are discussed in §6. The glyphs have also been reworked, and additional characters used in the Early Dynastic period have been added.

The non-numeric signs of proto-cuneiform will be the subject of a separate proposal; we need only note here that the divergence between the approaches to character identity in modern scholarship requires that proto-cuneiform be disunified from cuneiform: proto-cuneiform is effectively treated as an undeciphered script. In contrast, the cuneiform encoding model requires an understanding of the text to correctly encode it.

However, the *numerals* used in proto-cuneiform should be unified with ones used in the Early Dynastic period, for the reasons set forth in §4. The proposed “curved”, or “curviform”, numerals³ should however *not* be unified with the already-

¹[ISO15924]: Xsux, Script property value long name: Cuneiform; encoded since Unicode Version 5.0.

²[ISO15924]: Pcup, not yet encoded.

³Impressed into clay using cylindrical styli, held either perpendicular to the tablet, yielding • (small stylus) or ● (large stylus), or at a shallower angle: ◻, ◻ (small stylus), ◻, ◻ (large stylus). Some numerals are composed of multiple such impressions, e.g., ◻◻. The terms “curved”, “curviform”, “curvilinear”, and “round” can be found in the literature. We avoid the term “round” here as it has other meanings in the context of numbers. We use “curviform” in this document as, being the least common term, it is least likely to lead to confusion, and “CURVED” in the character names for consistency with documentation about the modifier @c used in machine readable ATF transliterations [Tin19].

encoded cuneiform numerals⁴. Since the encoding proposals for the cuneiform script twenty years ago provisionally considered the curviform numerals to be glyph variants of the cuneiform numerals, a detailed rationale is provided in §3, including compatibility considerations in §3.7.

The overall picture of unifications and disunifications over time is illustrated in table 1. The Script_Extensions property assignments in §2.3 reflect the overlap. A highlighted chart is attached to this document, providing an overview of the Script_Extensions values for the proposed characters (yellow for Xsux, green for Pcun). Characters with Script_Extensions={Xsux, Pcun} have Script=Cuneiform, reflecting the expectation that they will more frequently be used in third millennium scholarship than fourth millennium scholarship. Many of these numerals are also used in proto-Elamite⁵ texts, where they are treated as identical characters in scholarship on proto-Elamite, so that they should be unified with those that were proposed (but not yet accepted) in [L2/23-196]. However, in the interest of time, we do not provide a detailed rationale for this unification in this document, and we are not proposing that the numerals be given the corresponding Script_Extensions property value for now. Neither do we propose encoding any numerals that are solely attested in proto-Elamite texts, or well-attested in proto-Elamite texts but insufficiently attested in Uruk—those are discussed in §6.

	Uruk III & earlier	ED – Ur III	OB & later
Numerals	This proposal		
		Existing Xsux	
Non-numeric signs	Future Pcun		

Table 1: Usage of existing, proposed, and future characters across functions and time periods.

2 Proposed changes to the Standard

2.1 Core specification text

Amend [Uni6, §11.1.2, sub “Cuneiform Numerals”], as follows:

Cuneiform Numerals. In general, numerals that also have a phonetic, logographic, or determinative value are encoded in the main Cuneiform block; as a result, some series of numerals, such as 𐎠–𐎡𐎢𐎣 1(diš)–9(diš) or 𐎠–𐎡𐎢𐎣 1(u)–9(u), are split across the two blocks. Numerals have been encoded separately from signs that are visually identical but semantically different etymologically unrelated (for example, U+1244F 𐎠 CUNEIFORM NUMERIC SIGN ONE BAN2, U+12450 𐎡 CUNEIFORM NUMERIC SIGN TWO BAN2, and so on, versus U+12226 𐎠 CUNEIFORM SIGN MASH, U+1227A 𐎡 CUNEIFORM SIGN PA, and so on).

The relation between series of numerals depends on the metrological system; for instance, when counting talents, written 𐎠𐎡 (a unit of

⁴Impressed into clay using a stylus with a trihedral end: 𐎠 (stylus held horizontally), 𐎡 (vertically), 𐎢 (diagonally) 𐎣 (with the head of the stylus), 𐎤 (stylus pressed deeper, forming a larger wedge), 𐎥 (combining 𐎡 and 𐎣), etc.

⁵[ISO15924]: Pelm, not yet encoded.

weight, approximately 30 kg),  is used for “one talent”, and  for “ten talents”. However, when measuring areas, the area  (one *būrum*) is eighteen times  (one *ikûm*, approximately 3600 m²). The Numeric_Value property assignment of a cuneiform numeral therefore reflects only its relation to the first numeral in its series, rather than the absolute numeric value that it might represent. For instance, the number “fifty” is written , but U+12410  CUNEIFORM NUMERIC SIGN FIVE U has Numeric_Value=5, as it is 5 × .

In the third millennium, and especially in the Early Dynastic period, some numerals are written using a cylindrical tool, rather than the cuneiform stylus, forming curved rather than cuneiform numerals ( rather than ). The cuneiform numerals are descended from these curved numerals. However, in the Early Dynastic period, the curved numerals contrast with the cuneiform ones, and are used together with them in several metrological systems; they are therefore separately encoded. Most curved numerals are encoded in the Archaic Cuneiform Numerals block, with the exception of two fractions in the Cuneiform Numbers and Punctuation block: U+1245D  CUNEIFORM NUMERIC SIGN ONE THIRD VARIANT FORM A and U+1245E  CUNEIFORM NUMERIC SIGN TWO THIRDS VARIANT FORM A, the curved counterparts of U+1245A  CUNEIFORM NUMERIC SIGN ONE THIRD DISH and U+1245B  CUNEIFORM NUMERIC SIGN TWO THIRDS DISH.

Add after [Uni16, §11.1.3]:

11.1.4 Archaic Cuneiform Numerals: U+12550–U+1268F

This block contains numerals used in the fourth millennium and third millennium. The numerals that are used in the fourth millennium and Early Dynastic I–II period (2900–2700 BCE) are named according to the conventions of the Berlin *Archaische Texte aus Uruk* (ATU) project, with names such as U+12550  CUNEIFORM NUMERIC SIGN ONE N01 or U+125B6  CUNEIFORM NUMERIC SIGN ONE N39A. For the signs that are also used in the third millennium, informative aliases provide correspondences to more common third millennium conventions, such as “1 aš curved” for U+12550  CUNEIFORM NUMERIC SIGN ONE N01. The numerals that are only used starting in the Early Dynastic III period, where the ATU notation is not used, are named in the same fashion as the numerals of the Cuneiform Numbers and Punctuation block.

The curved numerals are produced using cylindrical tools of two different sizes, producing small curved indents (, , and ), and large ones (, , and ). These can be combined, as in U+12574  CUNEIFORM NUMERIC SIGN ONE N48, U+12582  CUNEIFORM NUMERIC SIGN ONE N50, or U+125A3  CUNEIFORM NUMERIC SIGN ONE N54. Consistent sizing is important to identifying these characters, as there is no visual distinction other than size between, for instance, U+12566  CUNEIFORM NUMERIC SIGN FIVE N14 and U+1257D  CUNEIFORM NUMERIC SIGN FIVE N45. The reference glyphs of some of the larger signs have been resized to fit in the code charts cells, but fonts for these characters should retain consistent size across the numeral series.

Editor’s note: The dashed-box convention for wide dashes, see

[Unit6, §24.1.2, sub “Dashed Box Convention”] should probably not be extended to these characters, since numbers enclosed in a real dashed box are a thing in proto-Elamite texts.

The Numeric_Value assignments follow the same principles as in the Cuneiform Numbers and Punctuation block. Numerals used in the third millennium have the Cuneiform script property value; numerals used only in the fourth millennium have the Proto-Cuneiform script property value. Numerals used in both the fourth and third millennium have both scripts in their Script_Extensions values.

The sign ŠAR₂. When used logographically, the sign ŠAR₂ has the same (cuneiform) appearance as U+1212D  CUNEIFORM SIGN HI in all but the most archaizing Early Dynastic texts. The character U+122B9 CUNEIFORM SIGN SHAR2 should be used for logographic šar₂, whether cuneiform or curved. Most period-specific fonts will have the same cuneiform glyph for U+122B9 and U+1212D. In the Early Dynastic period, numeric 1 šar₂ is typically written with a curved glyph, contrasting with logographic šar₂. U+12579  CUNEIFORM NUMERIC SIGN ONE N45 should be used for curved 1 šar₂. In later periods, long after ŠAR₂ and 𐎧I have merged, even numeric 1 šar₂ has a cuneiform glyph. U+122B9 CUNEIFORM SIGN SHAR2 should be used for cuneiform 1 šar₂.

The reference glyph for U+122B9  CUNEIFORM SIGN SHAR2 is curved, reflecting the rarer and more archaic practice, instead of cuneiform as it would be in the Ur III period, so as to distinguish it from U+1212D  CUNEIFORM SIGN HI.

2.2 Code charts

The code charts for the proposed block, including the character names list with proposed informative aliases, cross references, and informative notes, are shown on the following pages. A plain text file containing the [NamesList.txt](#) lines is attached to this document.

This space for rent.

	1255	1256	1257	1258	1259	125A	125B	125C	125D	125E
0	12550	12560	12570	12580	12590	125A0	125B0	125C0	125D0	125E0
1	12551	12561	12571	12581	12591	125A1	125B1	125C1	125D1	125E1
2	12552	12562	12572	12582	12592	125A2	125B2	125C2	125D2	125E2
3	12553	12563	12573	12583	12593	125A3	125B3	125C3	125D3	125E3
4	12554	12564	12574	12584	12594	125A4	125B4	125C4	125D4	125E4
5	12555	12565	12575	12585	12595	125A5	125B5	125C5	125D5	125E5
6	12556	12566	12576	12586	12596	125A6	125B6	125C6	125D6	125E6
7	12557	12567	12577	12587	12597	125A7	125B7	125C7	125D7	125E7
8	12558	12568	12578	12588	12598	125A8	125B8	125C8	125D8	125E8
9	12559	12569	12579	12589	12599	125A9	125B9	125C9	125D9	125E9
A	1255A	1256A	1257A	1258A	1259A	125AA	125BA	125CA	125DA	125EA
B	1255B	1256B	1257B	1258B	1259B	125AB	125BB	125CB	125DB	125EB
C	1255C	1256C	1257C	1258C	1259C	125AC	125BC	125CC	125DC	125EC
D	1255D	1256D	1257D	1258D	1259D	125AD	125BD	125CD	125DD	125ED
E	1255E	1256E	1257E	1258E	1259E	125AE	125BE	125CE	125DE	125EE
F	1255F	1256F	1257F	1258F	1259F	125AF	125BF	125CF	125DF	125EF

	125F	1260	1261	1262	1263	1264	1265	1266	1267	1268
0	125F0	12600	12610	12620	12630	12640	12650	12660	12670	12680
1	125F1	12601	12611	12621	12631	12641	12651	12661	12671	12681
2	125F2	12602	12612	12622	12632	12642	12652	12662	12672	12682
3	125F3	12603	12613	12623	12633	12643	12653	12663	12673	12683
4	125F4	12604	12614	12624	12634	12644	12654	12664	12674	12684
5	125F5	12605	12615	12625	12635	12645	12655	12665	12675	12685
6	125F6	12606	12616	12626	12636	12646	12656	12666	12676	12686
7	125F7	12607	12617	12627	12637	12647	12657	12667	12677	
8	125F8	12608	12618	12628	12638	12648	12658	12668	12678	
9	125F9	12609	12619	12629	12639	12649	12659	12669	12679	
A	125FA	1260A	1261A	1262A	1263A	1264A	1265A	1266A	1267A	
B	125FB	1260B	1261B	1262B	1263B	1264B	1265B	1266B	1267B	
C	125FC	1260C	1261C	1262C	1263C	1264C	1265C	1266C	1267C	
D	125FD	1260D	1261D	1262D	1263D	1264D	1265D	1266D	1267D	
E	125FE	1260E	1261E	1262E	1263E	1264E	1265E	1266E	1267E	
F	125FF	1260F	1261F	1262F	1263F	1264F	1265F	1266F	1267F	

Many of the reference glyphs for the higher numbers (THREE and above, in some cases TWO) have been rescaled to fit the code chart cells. They should be sized consistently with the corresponding ONE numerals.

Common Numerals

Used in the sexagesimal discrete counting system and other metrological systems

12550	▷	CUNEIFORM NUMERIC SIGN ONE N01	= 1 aš curved → 12038 𐎠 cuneiform sign ash • often used instead of diš in Early Dynastic counterparts of cuneiform metrological systems → 12079 𐎡 cuneiform sign dish
12551	◁	CUNEIFORM NUMERIC SIGN TWO N01	→ 12400 𐎢 cuneiform numeric sign two ash
12552	◁◁	CUNEIFORM NUMERIC SIGN THREE N01	
12553	◁◁◁	CUNEIFORM NUMERIC SIGN FOUR N01	
12554	◁◁◁◁	CUNEIFORM NUMERIC SIGN FIVE N01	
12555	◁◁◁◁◁	CUNEIFORM NUMERIC SIGN SIX N01	
12556	◁◁◁◁◁◁	CUNEIFORM NUMERIC SIGN SEVEN N01	
12557	◁◁◁◁◁◁◁	CUNEIFORM NUMERIC SIGN EIGHT N01	
12558	◁◁◁◁◁◁◁◁	CUNEIFORM NUMERIC SIGN NINE N01	
12559	◁	CUNEIFORM NUMERIC SIGN ONE N08	= 1 diš curved → 12079 𐎡 cuneiform sign dish = 1/2 iku curved • used for one half in multiple metrological systems → 12039 𐎠 cuneiform sign ash zida tenu → 12226 𐎡 cuneiform sign mash = 1 bariga curved • used in Early Dynastic capacity systems
1255A	◁	CUNEIFORM NUMERIC SIGN TWO N08	→ 1222B 𐎢 cuneiform sign min = 2 bariga curved → 12456 𐎣 cuneiform numeric sign nigidamin
1255B	◁◁	CUNEIFORM NUMERIC SIGN THREE N08	→ 12408 𐎣 cuneiform numeric sign three dish • used in Early Dynastic capacity systems = 3 bariga curved → 12457 𐎣 cuneiform numeric sign nigidaesh
1255C	◁◁◁	CUNEIFORM NUMERIC SIGN FOUR N08	
1255D	◁◁◁◁	CUNEIFORM NUMERIC SIGN FIVE N08	
1255E	◁◁◁◁◁	CUNEIFORM NUMERIC SIGN SIX N08	
1255F	◁◁◁◁◁◁	CUNEIFORM NUMERIC SIGN SEVEN N08	
12560	◁◁◁◁◁◁◁	CUNEIFORM NUMERIC SIGN EIGHT N08	
12561	◁◁◁◁◁◁◁◁	CUNEIFORM NUMERIC SIGN NINE N08	
12562	•	CUNEIFORM NUMERIC SIGN ONE N14	= 1 u curved = 1 bur ₃ curved → 1230B 𐎠 cuneiform sign u
12563	•	CUNEIFORM NUMERIC SIGN TWO N14	→ 12399 𐎡 cuneiform sign u u
12564	••	CUNEIFORM NUMERIC SIGN THREE N14	→ 1230D 𐎢 cuneiform sign u u u
12565	•••	CUNEIFORM NUMERIC SIGN FOUR N14	→ 1240F 𐎣 cuneiform numeric sign four u
12566	••••	CUNEIFORM NUMERIC SIGN FIVE N14	
12567	•••••	CUNEIFORM NUMERIC SIGN SIX N14	
12568	••••••	CUNEIFORM NUMERIC SIGN SEVEN N14	
12569	•••••••	CUNEIFORM NUMERIC SIGN EIGHT N14	
1256A	••••••••	CUNEIFORM NUMERIC SIGN NINE N14	

1256B	▷	CUNEIFORM NUMERIC SIGN ONE N34	= 1 𐎠š ₂ curved → 12415 𐎡 cuneiform numeric sign one gesh ₂
1256C	▷▷	CUNEIFORM NUMERIC SIGN TWO N34	
1256D	▷▷▷	CUNEIFORM NUMERIC SIGN THREE N34	
1256E	▷▷▷▷	CUNEIFORM NUMERIC SIGN FOUR N34	
1256F	▷▷▷▷▷	CUNEIFORM NUMERIC SIGN FIVE N34	
12570	▷▷▷▷▷◁	CUNEIFORM NUMERIC SIGN SIX N34	
12571	▷▷▷▷▷◁◁	CUNEIFORM NUMERIC SIGN SEVEN N34	
12572	▷▷▷▷▷◁◁◁	CUNEIFORM NUMERIC SIGN EIGHT N34	
12573	▷▷▷▷▷◁◁◁◁	CUNEIFORM NUMERIC SIGN NINE N34	
12574	▷	CUNEIFORM NUMERIC SIGN ONE N48	= 1 𐎠š ₃ u curved → 1241E 𐎡 cuneiform numeric sign one gesh _u
12575	◁◁	CUNEIFORM NUMERIC SIGN TWO N48	
12576	◁◁◁	CUNEIFORM NUMERIC SIGN THREE N48	
12577	◁◁◁◁	CUNEIFORM NUMERIC SIGN FOUR N48	
12578	◁◁◁◁◁	CUNEIFORM NUMERIC SIGN FIVE N48	
12579	•	CUNEIFORM NUMERIC SIGN ONE N45	= 1 šar ₂ curved • 122B9 • should be used for cuneiform 1 šar ₂ • 122B9 • should be used for logographic šar ₂ , even when curved → 122B9 • cuneiform sign shar ₂
1257A	••	CUNEIFORM NUMERIC SIGN TWO N45	
1257B	•••	CUNEIFORM NUMERIC SIGN THREE N45	
1257C	••••	CUNEIFORM NUMERIC SIGN FOUR N45	
1257D	•••••	CUNEIFORM NUMERIC SIGN FIVE N45	
1257E	••••••	CUNEIFORM NUMERIC SIGN SIX N45	
1257F	•••••••	CUNEIFORM NUMERIC SIGN SEVEN N45	
12580	••••••••	CUNEIFORM NUMERIC SIGN EIGHT N45	
12581	•••••••••	CUNEIFORM NUMERIC SIGN NINE N45	
12582	•	CUNEIFORM NUMERIC SIGN ONE N50	= 1 šar' u curved → 1242C 𐎡 cuneiform numeric sign one shar _u • used instead of 1258E • in fourth millennium land area systems → 12434 𐎡 cuneiform numeric sign one buru
12583	••	CUNEIFORM NUMERIC SIGN TWO N50	
12584	•••	CUNEIFORM NUMERIC SIGN THREE N50	
12585	••••	CUNEIFORM NUMERIC SIGN FOUR N50	
12586	•••••	CUNEIFORM NUMERIC SIGN FIVE N50	

Numerals used for land areas

Together with N08, N01, N14, N45, and N50

12587	•	CUNEIFORM NUMERIC SIGN ONE EIGHTH IKU CURVED	→ 1245F 𐎡 cuneiform numeric sign one eighth ash
12588	•	CUNEIFORM NUMERIC SIGN ONE EIGHTH IKU CURVED VARIANT FORM	
12589	◁	CUNEIFORM NUMERIC SIGN ONE N01 REVERSED	= 1/4 iku curved → 12460 𐎠 cuneiform numeric sign one quarter ash
1258A	◁	CUNEIFORM NUMERIC SIGN ONE QUARTER IKU CURVED VARIANT FORM	
1258B	•	CUNEIFORM NUMERIC SIGN ONE HALF IKU CURVED VARIANT FORM	→ 12039 𐎠 cuneiform sign ash zida tenu
1258C	•	CUNEIFORM NUMERIC SIGN ONE N22	= 1 eše ₃ curved → 12458 𐎠 cuneiform numeric sign one eshe ₃
1258D	•	CUNEIFORM NUMERIC SIGN TWO N22	
1258E	•	CUNEIFORM NUMERIC SIGN ONE BURU CURVED	→ 12434 𐎡 cuneiform numeric sign one buru
1258F	•	CUNEIFORM NUMERIC SIGN TWO BURU CURVED	
12590	•	CUNEIFORM NUMERIC SIGN THREE BURU CURVED	

- 12591  CUNEIFORM NUMERIC SIGN FOUR BURU CURVED
 12592  CUNEIFORM NUMERIC SIGN FIVE BURU CURVED

Early Dynastic capacity measures

- 12593  CUNEIFORM NUMERIC SIGN ONE BAN2 CURVED
 → 1244F  cuneiform numeric sign one ban2
 = 1/2 aš curved
 • used for one half in multiple metrological systems
 → 12226  cuneiform sign mash
- 12594  CUNEIFORM NUMERIC SIGN TWO BAN2 CURVED
 12595  CUNEIFORM NUMERIC SIGN THREE BAN2 CURVED
 12596  CUNEIFORM NUMERIC SIGN FOUR BAN2 CURVED
 12597  CUNEIFORM NUMERIC SIGN FIVE BAN2 CURVED

Early Dynastic weight fractions

- 12598  CUNEIFORM NUMERIC SIGN NINDA2 TIMES SHE PLUS ONE ASH CURVED
 = 1/3 aš curved variant form
 → 1245D  cuneiform numeric sign one third variant form a
 → 1245A  cuneiform numeric sign one third dish
- 12599  CUNEIFORM NUMERIC SIGN NINDA2 TIMES SHE PLUS TWO ASH CURVED
 = 2/3 aš curved variant form
 → 1245E  cuneiform numeric sign two thirds variant form a
 → 1245B  cuneiform numeric sign two thirds dish

Numerals used in the bisexagesimal system

Together with N08, N01, N14, and N34

- 1259A  CUNEIFORM NUMERIC SIGN ONE N51
 = 1 $\eta\epsilon\check{s}_2$ curved doubled, 1 $\eta\epsilon\check{s}min$ curved
- 1259B  CUNEIFORM NUMERIC SIGN TWO N51
 1259C  CUNEIFORM NUMERIC SIGN THREE N51
 1259D  CUNEIFORM NUMERIC SIGN FOUR N51
 1259E  CUNEIFORM NUMERIC SIGN FIVE N51
 1259F  CUNEIFORM NUMERIC SIGN SIX N51
 125A0  CUNEIFORM NUMERIC SIGN SEVEN N51
 125A1  CUNEIFORM NUMERIC SIGN EIGHT N51
 125A2  CUNEIFORM NUMERIC SIGN NINE N51
 125A3  CUNEIFORM NUMERIC SIGN ONE N54
 = 1 $\eta\epsilon\check{s}'u$ curved doubled, 1 $\eta\epsilon\check{s}min'u$ curved
- 125A4  CUNEIFORM NUMERIC SIGN TWO N54
 125A5  CUNEIFORM NUMERIC SIGN THREE N54
 125A6  CUNEIFORM NUMERIC SIGN FOUR N54
 125A7  CUNEIFORM NUMERIC SIGN FIVE N54
 125A8  CUNEIFORM NUMERIC SIGN ONE N56
 125A9  CUNEIFORM NUMERIC SIGN TWO N56

Fourth millennium grain capacity measures

Used with N01, N14, N45, N34, and N48

- 125AA  CUNEIFORM NUMERIC SIGN ONE N24
 125AB  CUNEIFORM NUMERIC SIGN ONE N26
 125AC  CUNEIFORM NUMERIC SIGN ONE N28
 125AD  CUNEIFORM NUMERIC SIGN ONE N29A
 125AE  CUNEIFORM NUMERIC SIGN ONE N29B
 125AF  CUNEIFORM NUMERIC SIGN ONE N30A
 125B0  CUNEIFORM NUMERIC SIGN ONE N30C
 125B1  CUNEIFORM NUMERIC SIGN ONE N30D
 125B2  CUNEIFORM NUMERIC SIGN ONE N30E
 125B3  CUNEIFORM NUMERIC SIGN ONE N31
 125B4  CUNEIFORM NUMERIC SIGN ONE N32
 125B5  CUNEIFORM NUMERIC SIGN ONE N33
 125B6  CUNEIFORM NUMERIC SIGN ONE N39A
 125B7  CUNEIFORM NUMERIC SIGN TWO N39A
 125B8  CUNEIFORM NUMERIC SIGN THREE N39A

- 125B9  CUNEIFORM NUMERIC SIGN FOUR N39A
 125BA  CUNEIFORM NUMERIC SIGN ONE N39B
 125BB  CUNEIFORM NUMERIC SIGN TWO N39B
 125BC  CUNEIFORM NUMERIC SIGN THREE N39B
 125BD  CUNEIFORM NUMERIC SIGN FOUR N39B

Numerals of sexagesimal system S'

Used to count dead animals and jars of certain types of liquids

- 125BE  CUNEIFORM NUMERIC SIGN ONE N02
 125BF  CUNEIFORM NUMERIC SIGN TWO N02
 125C0  CUNEIFORM NUMERIC SIGN THREE N02
 125C1  CUNEIFORM NUMERIC SIGN FOUR N02
 125C2  CUNEIFORM NUMERIC SIGN FIVE N02
 125C3  CUNEIFORM NUMERIC SIGN SIX N02
 125C4  CUNEIFORM NUMERIC SIGN SEVEN N02
 125C5  CUNEIFORM NUMERIC SIGN EIGHT N02
 125C6  CUNEIFORM NUMERIC SIGN NINE N02
 125C7  CUNEIFORM NUMERIC SIGN ONE N15
 125C8  CUNEIFORM NUMERIC SIGN TWO N15
 125C9  CUNEIFORM NUMERIC SIGN THREE N15
 125CA  CUNEIFORM NUMERIC SIGN FOUR N15
 125CB  CUNEIFORM NUMERIC SIGN FIVE N15
 125CC  CUNEIFORM NUMERIC SIGN ONE N35
 125CD  CUNEIFORM NUMERIC SIGN TWO N35
 125CE  CUNEIFORM NUMERIC SIGN THREE N35
 125CF  CUNEIFORM NUMERIC SIGN FOUR N35
 125D0  CUNEIFORM NUMERIC SIGN FIVE N35

Numerals of bisexagesimal system B*

Used in the fourth millennium to count rations of an unclear nature

- 125D1  CUNEIFORM NUMERIC SIGN ONE N06
 125D2  CUNEIFORM NUMERIC SIGN TWO N06
 125D3  CUNEIFORM NUMERIC SIGN THREE N06
 125D4  CUNEIFORM NUMERIC SIGN FOUR N06
 125D5  CUNEIFORM NUMERIC SIGN FIVE N06
 125D6  CUNEIFORM NUMERIC SIGN SIX N06
 125D7  CUNEIFORM NUMERIC SIGN SEVEN N06
 125D8  CUNEIFORM NUMERIC SIGN EIGHT N06
 125D9  CUNEIFORM NUMERIC SIGN NINE N06
 125DA  CUNEIFORM NUMERIC SIGN ONE N21
 125DB  CUNEIFORM NUMERIC SIGN TWO N21
 125DC  CUNEIFORM NUMERIC SIGN THREE N21
 125DD  CUNEIFORM NUMERIC SIGN FOUR N21
 125DE  CUNEIFORM NUMERIC SIGN FIVE N21
 125DF  CUNEIFORM NUMERIC SIGN ONE N38
 125E0  CUNEIFORM NUMERIC SIGN ONE N52
 125E1  CUNEIFORM NUMERIC SIGN TWO N52
 125E2  CUNEIFORM NUMERIC SIGN THREE N52
 125E3  CUNEIFORM NUMERIC SIGN FOUR N52
 125E4  CUNEIFORM NUMERIC SIGN FIVE N52
 125E5  CUNEIFORM NUMERIC SIGN SIX N52
 125E6  CUNEIFORM NUMERIC SIGN SEVEN N52
 125E7  CUNEIFORM NUMERIC SIGN EIGHT N52
 125E8  CUNEIFORM NUMERIC SIGN NINE N52
 125E9  CUNEIFORM NUMERIC SIGN ONE N60

Numerals of capacity system Š'

Used in the fourth millennium to measure malted barley

- 125EA  CUNEIFORM NUMERIC SIGN ONE N24A
 125EB  CUNEIFORM NUMERIC SIGN ONE N40
 125EC  CUNEIFORM NUMERIC SIGN TWO N40
 125ED  CUNEIFORM NUMERIC SIGN THREE N40
 125EE  CUNEIFORM NUMERIC SIGN FOUR N40
 125EF  CUNEIFORM NUMERIC SIGN ONE N03
 125F0  CUNEIFORM NUMERIC SIGN TWO N03
 125F1  CUNEIFORM NUMERIC SIGN THREE N03
 125F2  CUNEIFORM NUMERIC SIGN FOUR N03
 125F3  CUNEIFORM NUMERIC SIGN FIVE N03
 125F4  CUNEIFORM NUMERIC SIGN ONE N18

125F5		CUNEIFORM NUMERIC SIGN TWO N18
125F6		CUNEIFORM NUMERIC SIGN THREE N18
125F7		CUNEIFORM NUMERIC SIGN FOUR N18
125F8		CUNEIFORM NUMERIC SIGN FIVE N18
125F9		CUNEIFORM NUMERIC SIGN SIX N18
125FA		CUNEIFORM NUMERIC SIGN SEVEN N18
125FB		CUNEIFORM NUMERIC SIGN EIGHT N18
125FC		CUNEIFORM NUMERIC SIGN NINE N18
125FD		CUNEIFORM NUMERIC SIGN ONE N45A

Numerals of capacity system Š"

Used in the fourth millennium to measure various kinds of emmer

125FE		CUNEIFORM NUMERIC SIGN ONE N24B
125FF		CUNEIFORM NUMERIC SIGN ONE N26B
12600		CUNEIFORM NUMERIC SIGN ONE N28B
12601		CUNEIFORM NUMERIC SIGN ONE N29AB
12602		CUNEIFORM NUMERIC SIGN ONE N41
12603		CUNEIFORM NUMERIC SIGN TWO N41
12604		CUNEIFORM NUMERIC SIGN THREE N41
12605		CUNEIFORM NUMERIC SIGN FOUR N41
12606		CUNEIFORM NUMERIC SIGN ONE N04
12607		CUNEIFORM NUMERIC SIGN TWO N04
12608		CUNEIFORM NUMERIC SIGN THREE N04
12609		CUNEIFORM NUMERIC SIGN FOUR N04
1260A		CUNEIFORM NUMERIC SIGN FIVE N04
1260B		CUNEIFORM NUMERIC SIGN ONE N19
1260C		CUNEIFORM NUMERIC SIGN TWO N19
1260D		CUNEIFORM NUMERIC SIGN THREE N19
1260E		CUNEIFORM NUMERIC SIGN FOUR N19
1260F		CUNEIFORM NUMERIC SIGN FIVE N19
12610		CUNEIFORM NUMERIC SIGN SIX N19
12611		CUNEIFORM NUMERIC SIGN SEVEN N19
12612		CUNEIFORM NUMERIC SIGN EIGHT N19
12613		CUNEIFORM NUMERIC SIGN NINE N19
12614		CUNEIFORM NUMERIC SIGN ONE N46
12615		CUNEIFORM NUMERIC SIGN TWO N46
12616		CUNEIFORM NUMERIC SIGN ONE N36
12617		CUNEIFORM NUMERIC SIGN TWO N36
12618		CUNEIFORM NUMERIC SIGN THREE N36
12619		CUNEIFORM NUMERIC SIGN FOUR N36
1261A		CUNEIFORM NUMERIC SIGN FIVE N36
1261B		CUNEIFORM NUMERIC SIGN SIX N36
1261C		CUNEIFORM NUMERIC SIGN SEVEN N36
1261D		CUNEIFORM NUMERIC SIGN EIGHT N36
1261E		CUNEIFORM NUMERIC SIGN NINE N36
1261F		CUNEIFORM NUMERIC SIGN ONE N49
12620		CUNEIFORM NUMERIC SIGN TWO N49
12621		CUNEIFORM NUMERIC SIGN THREE N49
12622		CUNEIFORM NUMERIC SIGN FOUR N49

Numerals of capacity system Š*

Used in the fourth millennium to measure barley groats

12623		CUNEIFORM NUMERIC SIGN ONE N25
12624		CUNEIFORM NUMERIC SIGN ONE N27
12625		CUNEIFORM NUMERIC SIGN ONE N28C
12626		CUNEIFORM NUMERIC SIGN ONE N29AC
12627		CUNEIFORM NUMERIC SIGN ONE N30AC
12628		CUNEIFORM NUMERIC SIGN ONE N30CC
12629		CUNEIFORM NUMERIC SIGN ONE N42A
1262A		CUNEIFORM NUMERIC SIGN TWO N42A
1262B		CUNEIFORM NUMERIC SIGN THREE N42A
1262C		CUNEIFORM NUMERIC SIGN FOUR N42A
1262D		CUNEIFORM NUMERIC SIGN ONE N42B
1262E		CUNEIFORM NUMERIC SIGN TWO N42B
1262F		CUNEIFORM NUMERIC SIGN THREE N42B
12630		CUNEIFORM NUMERIC SIGN FOUR N42B
12631		CUNEIFORM NUMERIC SIGN ONE N05
12632		CUNEIFORM NUMERIC SIGN TWO N05
12633		CUNEIFORM NUMERIC SIGN THREE N05

12634		CUNEIFORM NUMERIC SIGN FOUR N05
12635		CUNEIFORM NUMERIC SIGN FIVE N05
12636		CUNEIFORM NUMERIC SIGN ONE N20
12637		CUNEIFORM NUMERIC SIGN TWO N20
12638		CUNEIFORM NUMERIC SIGN THREE N20
12639		CUNEIFORM NUMERIC SIGN FOUR N20
1263A		CUNEIFORM NUMERIC SIGN FIVE N20
1263B		CUNEIFORM NUMERIC SIGN SIX N20
1263C		CUNEIFORM NUMERIC SIGN SEVEN N20
1263D		CUNEIFORM NUMERIC SIGN EIGHT N20
1263E		CUNEIFORM NUMERIC SIGN NINE N20
1263F		CUNEIFORM NUMERIC SIGN ONE N47
12640		CUNEIFORM NUMERIC SIGN TWO N47
12641		CUNEIFORM NUMERIC SIGN ONE N37
12642		CUNEIFORM NUMERIC SIGN TWO N37

Numerals of system EN

Only attested in the Uruk IV period

12643		CUNEIFORM NUMERIC SIGN ONE N09
12644		CUNEIFORM NUMERIC SIGN ONE N11
12645		CUNEIFORM NUMERIC SIGN ONE N12
12646		CUNEIFORM NUMERIC SIGN ONE N07A
12647		CUNEIFORM NUMERIC SIGN TWO N07A
12648		CUNEIFORM NUMERIC SIGN THREE N07A
12649		CUNEIFORM NUMERIC SIGN ONE N07B
1264A		CUNEIFORM NUMERIC SIGN TWO N07B
1264B		CUNEIFORM NUMERIC SIGN THREE N07B

Flat numerals

Rectangular numerals impressed with a flat tool, used in Ur in the Early Dynastic I–II period

1264C		CUNEIFORM NUMERIC SIGN ONE N01 FLAT = 1 aš flat → 12038 ← cuneiform sign ash
1264D		CUNEIFORM NUMERIC SIGN TWO N01 FLAT
1264E		CUNEIFORM NUMERIC SIGN THREE N01 FLAT
1264F		CUNEIFORM NUMERIC SIGN FOUR N01 FLAT
12650		CUNEIFORM NUMERIC SIGN FIVE N01 FLAT
12651		CUNEIFORM NUMERIC SIGN SIX N01 FLAT
12652		CUNEIFORM NUMERIC SIGN SEVEN N01 FLAT
12653		CUNEIFORM NUMERIC SIGN EIGHT N01 FLAT
12654		CUNEIFORM NUMERIC SIGN NINE N01 FLAT
12655		CUNEIFORM NUMERIC SIGN ONE N08 FLAT
12656		CUNEIFORM NUMERIC SIGN ONE N14 FLAT = 1 u flat → 1230B ← cuneiform sign u
12657		CUNEIFORM NUMERIC SIGN TWO N14 FLAT
12658		CUNEIFORM NUMERIC SIGN THREE N14 FLAT
12659		CUNEIFORM NUMERIC SIGN FOUR N14 FLAT
1265A		CUNEIFORM NUMERIC SIGN FIVE N14 FLAT
1265B		CUNEIFORM NUMERIC SIGN SIX N14 FLAT
1265C		CUNEIFORM NUMERIC SIGN SEVEN N14 FLAT
1265D		CUNEIFORM NUMERIC SIGN EIGHT N14 FLAT
1265E		CUNEIFORM NUMERIC SIGN NINE N14 FLAT
1265F		CUNEIFORM NUMERIC SIGN ONE N34 FLAT
12660		CUNEIFORM NUMERIC SIGN TWO N34 FLAT
12661		CUNEIFORM NUMERIC SIGN THREE N34 FLAT
12662		CUNEIFORM NUMERIC SIGN FOUR N34 FLAT
12663		CUNEIFORM NUMERIC SIGN FIVE N34 FLAT
12664		CUNEIFORM NUMERIC SIGN SIX N34 FLAT
12665		CUNEIFORM NUMERIC SIGN SEVEN N34 FLAT
12666		CUNEIFORM NUMERIC SIGN EIGHT N34 FLAT
12667		CUNEIFORM NUMERIC SIGN NINE N34 FLAT
12668		CUNEIFORM NUMERIC SIGN ONE N45 FLAT
12669		CUNEIFORM NUMERIC SIGN TWO N45 FLAT
1266A		CUNEIFORM NUMERIC SIGN ONE N22 FLAT
1266B		CUNEIFORM NUMERIC SIGN TWO N22 FLAT
1266C		CUNEIFORM NUMERIC SIGN ONE N51 FLAT
1266D		CUNEIFORM NUMERIC SIGN TWO N51 FLAT

1266E		CUNEIFORM NUMERIC SIGN THREE N51 FLAT
1266F		CUNEIFORM NUMERIC SIGN FOUR N51 FLAT
12670		CUNEIFORM NUMERIC SIGN FIVE N51 FLAT
12671		CUNEIFORM NUMERIC SIGN SIX N51 FLAT
12672		CUNEIFORM NUMERIC SIGN SEVEN N51 FLAT
12673		CUNEIFORM NUMERIC SIGN EIGHT N51 FLAT
12674		CUNEIFORM NUMERIC SIGN NINE N51 FLAT
12675		CUNEIFORM NUMERIC SIGN ONE N34 FLAT TENU = 1 n39a flat
12676		CUNEIFORM NUMERIC SIGN ONE N04 FLAT
12677		CUNEIFORM NUMERIC SIGN TWO N04 FLAT
12678		CUNEIFORM NUMERIC SIGN THREE N04 FLAT
12679		CUNEIFORM NUMERIC SIGN FOUR N04 FLAT
1267A		CUNEIFORM NUMERIC SIGN FIVE N04 FLAT
1267B		CUNEIFORM NUMERIC SIGN ONE N19 FLAT
1267C		CUNEIFORM NUMERIC SIGN TWO N19 FLAT
1267D		CUNEIFORM NUMERIC SIGN THREE N19 FLAT
1267E		CUNEIFORM NUMERIC SIGN FOUR N19 FLAT
1267F		CUNEIFORM NUMERIC SIGN FIVE N19 FLAT
12680		CUNEIFORM NUMERIC SIGN SIX N19 FLAT
12681		CUNEIFORM NUMERIC SIGN SEVEN N19 FLAT
12682		CUNEIFORM NUMERIC SIGN EIGHT N19 FLAT
12683		CUNEIFORM NUMERIC SIGN NINE N19 FLAT
12684		CUNEIFORM NUMERIC SIGN ONE N46 FLAT
12685		CUNEIFORM NUMERIC SIGN TWO N46 FLAT
12686		CUNEIFORM NUMERIC SIGN ONE N36 FLAT

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](#).

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12550;CUNEIFORM NUMERIC SIGN ONE N01;N1;0;L;;;;;1;N;;;;;
12551;CUNEIFORM NUMERIC SIGN TWO N01;N1;0;L;;;;;2;N;;;;;
12552;CUNEIFORM NUMERIC SIGN THREE N01;N1;0;L;;;;;3;N;;;;;
12553;CUNEIFORM NUMERIC SIGN FOUR N01;N1;0;L;;;;;4;N;;;;;
12554;CUNEIFORM NUMERIC SIGN FIVE N01;N1;0;L;;;;;5;N;;;;;
12555;CUNEIFORM NUMERIC SIGN SIX N01;N1;0;L;;;;;6;N;;;;;
12556;CUNEIFORM NUMERIC SIGN SEVEN N01;N1;0;L;;;;;7;N;;;;;
12557;CUNEIFORM NUMERIC SIGN EIGHT N01;N1;0;L;;;;;8;N;;;;;
12558;CUNEIFORM NUMERIC SIGN NINE N01;N1;0;L;;;;;9;N;;;;;
12559;CUNEIFORM NUMERIC SIGN ONE N08;N1;0;L;;;;;1;N;;;;;
1255A;CUNEIFORM NUMERIC SIGN TWO N08;N1;0;L;;;;;2;N;;;;;
1255B;CUNEIFORM NUMERIC SIGN THREE N08;N1;0;L;;;;;3;N;;;;;
1255C;CUNEIFORM NUMERIC SIGN FOUR N08;N1;0;L;;;;;4;N;;;;;
1255D;CUNEIFORM NUMERIC SIGN FIVE N08;N1;0;L;;;;;5;N;;;;;
1255E;CUNEIFORM NUMERIC SIGN SIX N08;N1;0;L;;;;;6;N;;;;;
1255F;CUNEIFORM NUMERIC SIGN SEVEN N08;N1;0;L;;;;;7;N;;;;;
12560;CUNEIFORM NUMERIC SIGN EIGHT N08;N1;0;L;;;;;8;N;;;;;
12561;CUNEIFORM NUMERIC SIGN NINE N08;N1;0;L;;;;;9;N;;;;;
12562;CUNEIFORM NUMERIC SIGN ONE N14;N1;0;L;;;;;1;N;;;;;
12563;CUNEIFORM NUMERIC SIGN TWO N14;N1;0;L;;;;;2;N;;;;;
12564;CUNEIFORM NUMERIC SIGN THREE N14;N1;0;L;;;;;3;N;;;;;
12565;CUNEIFORM NUMERIC SIGN FOUR N14;N1;0;L;;;;;4;N;;;;;
12566;CUNEIFORM NUMERIC SIGN FIVE N14;N1;0;L;;;;;5;N;;;;;
12567;CUNEIFORM NUMERIC SIGN SIX N14;N1;0;L;;;;;6;N;;;;;
12568;CUNEIFORM NUMERIC SIGN SEVEN N14;N1;0;L;;;;;7;N;;;;;
12569;CUNEIFORM NUMERIC SIGN EIGHT N14;N1;0;L;;;;;8;N;;;;;
1256A;CUNEIFORM NUMERIC SIGN NINE N14;N1;0;L;;;;;9;N;;;;;
1256B;CUNEIFORM NUMERIC SIGN ONE N34;N1;0;L;;;;;1;N;;;;;
1256C;CUNEIFORM NUMERIC SIGN TWO N34;N1;0;L;;;;;2;N;;;;;
1256D;CUNEIFORM NUMERIC SIGN THREE N34;N1;0;L;;;;;3;N;;;;;
1256E;CUNEIFORM NUMERIC SIGN FOUR N34;N1;0;L;;;;;4;N;;;;;
1256F;CUNEIFORM NUMERIC SIGN FIVE N34;N1;0;L;;;;;5;N;;;;;
12570;CUNEIFORM NUMERIC SIGN SIX N34;N1;0;L;;;;;6;N;;;;;
12571;CUNEIFORM NUMERIC SIGN SEVEN N34;N1;0;L;;;;;7;N;;;;;
12572;CUNEIFORM NUMERIC SIGN EIGHT N34;N1;0;L;;;;;8;N;;;;;
12573;CUNEIFORM NUMERIC SIGN NINE N34;N1;0;L;;;;;9;N;;;;;
12574;CUNEIFORM NUMERIC SIGN ONE N48;N1;0;L;;;;;1;N;;;;;
12575;CUNEIFORM NUMERIC SIGN TWO N48;N1;0;L;;;;;2;N;;;;;
12576;CUNEIFORM NUMERIC SIGN THREE N48;N1;0;L;;;;;3;N;;;;;
12577;CUNEIFORM NUMERIC SIGN FOUR N48;N1;0;L;;;;;4;N;;;;;
12578;CUNEIFORM NUMERIC SIGN FIVE N48;N1;0;L;;;;;5;N;;;;;
12579;CUNEIFORM NUMERIC SIGN ONE N45;N1;0;L;;;;;1;N;;;;;
1257A;CUNEIFORM NUMERIC SIGN TWO N45;N1;0;L;;;;;2;N;;;;;
1257B;CUNEIFORM NUMERIC SIGN THREE N45;N1;0;L;;;;;3;N;;;;;
1257C;CUNEIFORM NUMERIC SIGN FOUR N45;N1;0;L;;;;;4;N;;;;;
1257D;CUNEIFORM NUMERIC SIGN FIVE N45;N1;0;L;;;;;5;N;;;;;
1257E;CUNEIFORM NUMERIC SIGN SIX N45;N1;0;L;;;;;6;N;;;;;
1257F;CUNEIFORM NUMERIC SIGN SEVEN N45;N1;0;L;;;;;7;N;;;;;
12580;CUNEIFORM NUMERIC SIGN EIGHT N45;N1;0;L;;;;;8;N;;;;;
12581;CUNEIFORM NUMERIC SIGN NINE N45;N1;0;L;;;;;9;N;;;;;
12582;CUNEIFORM NUMERIC SIGN ONE N50;N1;0;L;;;;;1;N;;;;;
12583;CUNEIFORM NUMERIC SIGN TWO N50;N1;0;L;;;;;2;N;;;;;
12584;CUNEIFORM NUMERIC SIGN THREE N50;N1;0;L;;;;;3;N;;;;;
12585;CUNEIFORM NUMERIC SIGN FOUR N50;N1;0;L;;;;;4;N;;;;;
12586;CUNEIFORM NUMERIC SIGN FIVE N50;N1;0;L;;;;;5;N;;;;;
12587;CUNEIFORM NUMERIC SIGN ONE EIGHTH IKU CURVED;N1;0;L;;;;;1/8;N;;;;;
12588;CUNEIFORM NUMERIC SIGN ONE EIGHTH IKU CURVED VARIANT FORM;N1;0;L;;;;;1/8;N;;;;;
12589;CUNEIFORM NUMERIC SIGN ONE N01 REVERSED;N1;0;L;;;;;1/4;N;;;;;
1258A;CUNEIFORM NUMERIC SIGN ONE QUARTER IKU CURVED VARIANT FORM;N1;0;L;;;;;1/4;N;;;;;
1258B;CUNEIFORM NUMERIC SIGN ONE HALF IKU CURVED VARIANT FORM;N1;0;L;;;;;1/2;N;;;;;
1258C;CUNEIFORM NUMERIC SIGN ONE N22;N1;0;L;;;;;1;N;;;;;
1258D;CUNEIFORM NUMERIC SIGN TWO N22;N1;0;L;;;;;2;N;;;;;

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125D8;CUNEIFORM NUMERIC SIGN EIGHT N06;N1;0;L;8;N; ; ; ;
 125D9;CUNEIFORM NUMERIC SIGN NINE N06;N1;0;L;9;N; ; ; ;
 125DA;CUNEIFORM NUMERIC SIGN ONE N21;N1;0;L;1;N; ; ; ;
 125DB;CUNEIFORM NUMERIC SIGN TWO N21;N1;0;L;2;N; ; ; ;
 125DC;CUNEIFORM NUMERIC SIGN THREE N21;N1;0;L;3;N; ; ; ;
 125DD;CUNEIFORM NUMERIC SIGN FOUR N21;N1;0;L;4;N; ; ; ;
 125DE;CUNEIFORM NUMERIC SIGN FIVE N21;N1;0;L;5;N; ; ; ;
 125DF;CUNEIFORM NUMERIC SIGN ONE N38;N1;0;L;1;N; ; ; ;
 125E0;CUNEIFORM NUMERIC SIGN ONE N52;N1;0;L;1;N; ; ; ;
 125E1;CUNEIFORM NUMERIC SIGN TWO N52;N1;0;L;2;N; ; ; ;
 125E2;CUNEIFORM NUMERIC SIGN THREE N52;N1;0;L;3;N; ; ; ;
 125E3;CUNEIFORM NUMERIC SIGN FOUR N52;N1;0;L;4;N; ; ; ;
 125E4;CUNEIFORM NUMERIC SIGN FIVE N52;N1;0;L;5;N; ; ; ;
 125E5;CUNEIFORM NUMERIC SIGN SIX N52;N1;0;L;6;N; ; ; ;
 125E6;CUNEIFORM NUMERIC SIGN SEVEN N52;N1;0;L;7;N; ; ; ;
 125E7;CUNEIFORM NUMERIC SIGN EIGHT N52;N1;0;L;8;N; ; ; ;
 125E8;CUNEIFORM NUMERIC SIGN NINE N52;N1;0;L;9;N; ; ; ;
 125E9;CUNEIFORM NUMERIC SIGN ONE N60;N1;0;L;1;N; ; ; ;
 125EA;CUNEIFORM NUMERIC SIGN ONE N24A;N1;0;L;1;N; ; ; ;
 125EB;CUNEIFORM NUMERIC SIGN ONE N40;N1;0;L;1;N; ; ; ;
 125EC;CUNEIFORM NUMERIC SIGN TWO N40;N1;0;L;2;N; ; ; ;
 125ED;CUNEIFORM NUMERIC SIGN THREE N40;N1;0;L;3;N; ; ; ;
 125EE;CUNEIFORM NUMERIC SIGN FOUR N40;N1;0;L;4;N; ; ; ;
 125EF;CUNEIFORM NUMERIC SIGN ONE N03;N1;0;L;1;N; ; ; ;
 125F0;CUNEIFORM NUMERIC SIGN TWO N03;N1;0;L;2;N; ; ; ;
 125F1;CUNEIFORM NUMERIC SIGN THREE N03;N1;0;L;3;N; ; ; ;
 125F2;CUNEIFORM NUMERIC SIGN FOUR N03;N1;0;L;4;N; ; ; ;
 125F3;CUNEIFORM NUMERIC SIGN FIVE N03;N1;0;L;5;N; ; ; ;
 125F4;CUNEIFORM NUMERIC SIGN ONE N18;N1;0;L;1;N; ; ; ;
 125F5;CUNEIFORM NUMERIC SIGN TWO N18;N1;0;L;2;N; ; ; ;
 125F6;CUNEIFORM NUMERIC SIGN THREE N18;N1;0;L;3;N; ; ; ;
 125F7;CUNEIFORM NUMERIC SIGN FOUR N18;N1;0;L;4;N; ; ; ;
 125F8;CUNEIFORM NUMERIC SIGN FIVE N18;N1;0;L;5;N; ; ; ;
 125F9;CUNEIFORM NUMERIC SIGN SIX N18;N1;0;L;6;N; ; ; ;
 125FA;CUNEIFORM NUMERIC SIGN SEVEN N18;N1;0;L;7;N; ; ; ;
 125FB;CUNEIFORM NUMERIC SIGN EIGHT N18;N1;0;L;8;N; ; ; ;
 125FC;CUNEIFORM NUMERIC SIGN NINE N18;N1;0;L;9;N; ; ; ;
 125FD;CUNEIFORM NUMERIC SIGN ONE N45A;N1;0;L;1;N; ; ; ;
 125FE;CUNEIFORM NUMERIC SIGN ONE N24B;N1;0;L;1;N; ; ; ;
 125FF;CUNEIFORM NUMERIC SIGN ONE N26B;N1;0;L;1;N; ; ; ;
 12600;CUNEIFORM NUMERIC SIGN ONE N28B;N1;0;L;1;N; ; ; ;
 12601;CUNEIFORM NUMERIC SIGN ONE N29AB;N1;0;L;1;N; ; ; ;
 12602;CUNEIFORM NUMERIC SIGN ONE N41;N1;0;L;1;N; ; ; ;
 12603;CUNEIFORM NUMERIC SIGN TWO N41;N1;0;L;2;N; ; ; ;
 12604;CUNEIFORM NUMERIC SIGN THREE N41;N1;0;L;3;N; ; ; ;
 12605;CUNEIFORM NUMERIC SIGN FOUR N41;N1;0;L;4;N; ; ; ;
 12606;CUNEIFORM NUMERIC SIGN ONE N04;N1;0;L;1;N; ; ; ;
 12607;CUNEIFORM NUMERIC SIGN TWO N04;N1;0;L;2;N; ; ; ;
 12608;CUNEIFORM NUMERIC SIGN THREE N04;N1;0;L;3;N; ; ; ;
 12609;CUNEIFORM NUMERIC SIGN FOUR N04;N1;0;L;4;N; ; ; ;
 1260A;CUNEIFORM NUMERIC SIGN FIVE N04;N1;0;L;5;N; ; ; ;
 1260B;CUNEIFORM NUMERIC SIGN ONE N19;N1;0;L;1;N; ; ; ;
 1260C;CUNEIFORM NUMERIC SIGN TWO N19;N1;0;L;2;N; ; ; ;
 1260D;CUNEIFORM NUMERIC SIGN THREE N19;N1;0;L;3;N; ; ; ;
 1260E;CUNEIFORM NUMERIC SIGN FOUR N19;N1;0;L;4;N; ; ; ;
 1260F;CUNEIFORM NUMERIC SIGN FIVE N19;N1;0;L;5;N; ; ; ;
 12610;CUNEIFORM NUMERIC SIGN SIX N19;N1;0;L;6;N; ; ; ;
 12611;CUNEIFORM NUMERIC SIGN SEVEN N19;N1;0;L;7;N; ; ; ;
 12612;CUNEIFORM NUMERIC SIGN EIGHT N19;N1;0;L;8;N; ; ; ;
 12613;CUNEIFORM NUMERIC SIGN NINE N19;N1;0;L;9;N; ; ; ;
 12614;CUNEIFORM NUMERIC SIGN ONE N46;N1;0;L;1;N; ; ; ;
 12615;CUNEIFORM NUMERIC SIGN TWO N46;N1;0;L;2;N; ; ; ;
 12616;CUNEIFORM NUMERIC SIGN ONE N36;N1;0;L;1;N; ; ; ;
 12617;CUNEIFORM NUMERIC SIGN TWO N36;N1;0;L;2;N; ; ; ;
 12618;CUNEIFORM NUMERIC SIGN THREE N36;N1;0;L;3;N; ; ; ;
 12619;CUNEIFORM NUMERIC SIGN FOUR N36;N1;0;L;4;N; ; ; ;
 1261A;CUNEIFORM NUMERIC SIGN FIVE N36;N1;0;L;5;N; ; ; ;
 1261B;CUNEIFORM NUMERIC SIGN SIX N36;N1;0;L;6;N; ; ; ;
 1261C;CUNEIFORM NUMERIC SIGN SEVEN N36;N1;0;L;7;N; ; ; ;
 1261D;CUNEIFORM NUMERIC SIGN EIGHT N36;N1;0;L;8;N; ; ; ;
 1261E;CUNEIFORM NUMERIC SIGN NINE N36;N1;0;L;9;N; ; ; ;
 1261F;CUNEIFORM NUMERIC SIGN ONE N49;N1;0;L;1;N; ; ; ;
 12620;CUNEIFORM NUMERIC SIGN TWO N49;N1;0;L;2;N; ; ; ;
 12621;CUNEIFORM NUMERIC SIGN THREE N49;N1;0;L;3;N; ; ; ;

12622;CUNEIFORM NUMERIC SIGN FOUR N49;N1;0;L; ; ; ; ; 4;N; ; ; ; ;
12623;CUNEIFORM NUMERIC SIGN ONE N25;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12624;CUNEIFORM NUMERIC SIGN ONE N27;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12625;CUNEIFORM NUMERIC SIGN ONE N28C;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12626;CUNEIFORM NUMERIC SIGN ONE N29AC;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12627;CUNEIFORM NUMERIC SIGN ONE N30AC;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12628;CUNEIFORM NUMERIC SIGN ONE N30CC;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12629;CUNEIFORM NUMERIC SIGN ONE N42A;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
1262A;CUNEIFORM NUMERIC SIGN TWO N42A;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
1262B;CUNEIFORM NUMERIC SIGN THREE N42A;N1;0;L; ; ; ; ; 3;N; ; ; ; ;
1262C;CUNEIFORM NUMERIC SIGN FOUR N42A;N1;0;L; ; ; ; ; 4;N; ; ; ; ;
1262D;CUNEIFORM NUMERIC SIGN ONE N42B;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
1262E;CUNEIFORM NUMERIC SIGN TWO N42B;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
1262F;CUNEIFORM NUMERIC SIGN THREE N42B;N1;0;L; ; ; ; ; 3;N; ; ; ; ;
12630;CUNEIFORM NUMERIC SIGN FOUR N42B;N1;0;L; ; ; ; ; 4;N; ; ; ; ;
12631;CUNEIFORM NUMERIC SIGN ONE N05;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12632;CUNEIFORM NUMERIC SIGN TWO N05;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
12633;CUNEIFORM NUMERIC SIGN THREE N05;N1;0;L; ; ; ; ; 3;N; ; ; ; ;
12634;CUNEIFORM NUMERIC SIGN FOUR N05;N1;0;L; ; ; ; ; 4;N; ; ; ; ;
12635;CUNEIFORM NUMERIC SIGN FIVE N05;N1;0;L; ; ; ; ; 5;N; ; ; ; ;
12636;CUNEIFORM NUMERIC SIGN ONE N20;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12637;CUNEIFORM NUMERIC SIGN TWO N20;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
12638;CUNEIFORM NUMERIC SIGN THREE N20;N1;0;L; ; ; ; ; 3;N; ; ; ; ;
12639;CUNEIFORM NUMERIC SIGN FOUR N20;N1;0;L; ; ; ; ; 4;N; ; ; ; ;
1263A;CUNEIFORM NUMERIC SIGN FIVE N20;N1;0;L; ; ; ; ; 5;N; ; ; ; ;
1263B;CUNEIFORM NUMERIC SIGN SIX N20;N1;0;L; ; ; ; ; 6;N; ; ; ; ;
1263C;CUNEIFORM NUMERIC SIGN SEVEN N20;N1;0;L; ; ; ; ; 7;N; ; ; ; ;
1263D;CUNEIFORM NUMERIC SIGN EIGHT N20;N1;0;L; ; ; ; ; 8;N; ; ; ; ;
1263E;CUNEIFORM NUMERIC SIGN NINE N20;N1;0;L; ; ; ; ; 9;N; ; ; ; ;
1263F;CUNEIFORM NUMERIC SIGN ONE N47;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12640;CUNEIFORM NUMERIC SIGN TWO N47;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
12641;CUNEIFORM NUMERIC SIGN ONE N37;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12642;CUNEIFORM NUMERIC SIGN TWO N37;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
12643;CUNEIFORM NUMERIC SIGN ONE N09;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12644;CUNEIFORM NUMERIC SIGN ONE N11;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12645;CUNEIFORM NUMERIC SIGN ONE N12;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12646;CUNEIFORM NUMERIC SIGN ONE N07A;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12647;CUNEIFORM NUMERIC SIGN TWO N07A;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
12648;CUNEIFORM NUMERIC SIGN THREE N07A;N1;0;L; ; ; ; ; 3;N; ; ; ; ;
12649;CUNEIFORM NUMERIC SIGN ONE N07B;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
1264A;CUNEIFORM NUMERIC SIGN TWO N07B;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
1264B;CUNEIFORM NUMERIC SIGN THREE N07B;N1;0;L; ; ; ; ; 3;N; ; ; ; ;
1264C;CUNEIFORM NUMERIC SIGN ONE N01 FLAT;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
1264D;CUNEIFORM NUMERIC SIGN TWO N01 FLAT;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
1264E;CUNEIFORM NUMERIC SIGN THREE N01 FLAT;N1;0;L; ; ; ; ; 3;N; ; ; ; ;
1264F;CUNEIFORM NUMERIC SIGN FOUR N01 FLAT;N1;0;L; ; ; ; ; 4;N; ; ; ; ;
12650;CUNEIFORM NUMERIC SIGN FIVE N01 FLAT;N1;0;L; ; ; ; ; 5;N; ; ; ; ;
12651;CUNEIFORM NUMERIC SIGN SIX N01 FLAT;N1;0;L; ; ; ; ; 6;N; ; ; ; ;
12652;CUNEIFORM NUMERIC SIGN SEVEN N01 FLAT;N1;0;L; ; ; ; ; 7;N; ; ; ; ;
12653;CUNEIFORM NUMERIC SIGN EIGHT N01 FLAT;N1;0;L; ; ; ; ; 8;N; ; ; ; ;
12654;CUNEIFORM NUMERIC SIGN NINE N01 FLAT;N1;0;L; ; ; ; ; 9;N; ; ; ; ;
12655;CUNEIFORM NUMERIC SIGN ONE N08 FLAT;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12656;CUNEIFORM NUMERIC SIGN ONE N14 FLAT;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12657;CUNEIFORM NUMERIC SIGN TWO N14 FLAT;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
12658;CUNEIFORM NUMERIC SIGN THREE N14 FLAT;N1;0;L; ; ; ; ; 3;N; ; ; ; ;
12659;CUNEIFORM NUMERIC SIGN FOUR N14 FLAT;N1;0;L; ; ; ; ; 4;N; ; ; ; ;
1265A;CUNEIFORM NUMERIC SIGN FIVE N14 FLAT;N1;0;L; ; ; ; ; 5;N; ; ; ; ;
1265B;CUNEIFORM NUMERIC SIGN SIX N14 FLAT;N1;0;L; ; ; ; ; 6;N; ; ; ; ;
1265C;CUNEIFORM NUMERIC SIGN SEVEN N14 FLAT;N1;0;L; ; ; ; ; 7;N; ; ; ; ;
1265D;CUNEIFORM NUMERIC SIGN EIGHT N14 FLAT;N1;0;L; ; ; ; ; 8;N; ; ; ; ;
1265E;CUNEIFORM NUMERIC SIGN NINE N14 FLAT;N1;0;L; ; ; ; ; 9;N; ; ; ; ;
1265F;CUNEIFORM NUMERIC SIGN ONE N34 FLAT;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12660;CUNEIFORM NUMERIC SIGN TWO N34 FLAT;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
12661;CUNEIFORM NUMERIC SIGN THREE N34 FLAT;N1;0;L; ; ; ; ; 3;N; ; ; ; ;
12662;CUNEIFORM NUMERIC SIGN FOUR N34 FLAT;N1;0;L; ; ; ; ; 4;N; ; ; ; ;
12663;CUNEIFORM NUMERIC SIGN FIVE N34 FLAT;N1;0;L; ; ; ; ; 5;N; ; ; ; ;
12664;CUNEIFORM NUMERIC SIGN SIX N34 FLAT;N1;0;L; ; ; ; ; 6;N; ; ; ; ;
12665;CUNEIFORM NUMERIC SIGN SEVEN N34 FLAT;N1;0;L; ; ; ; ; 7;N; ; ; ; ;
12666;CUNEIFORM NUMERIC SIGN EIGHT N34 FLAT;N1;0;L; ; ; ; ; 8;N; ; ; ; ;
12667;CUNEIFORM NUMERIC SIGN NINE N34 FLAT;N1;0;L; ; ; ; ; 9;N; ; ; ; ;
12668;CUNEIFORM NUMERIC SIGN ONE N45 FLAT;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
12669;CUNEIFORM NUMERIC SIGN TWO N45 FLAT;N1;0;L; ; ; ; ; 2;N; ; ; ; ;
1266A;CUNEIFORM NUMERIC SIGN ONE N22 FLAT;N1;0;L; ; ; ; ; 1;N; ; ; ; ;
1266B;CUNEIFORM NUMERIC SIGN TWO N22 FLAT;N1;0;L; ; ; ; ; 2;N; ; ; ; ;

```

1266C;CUNEIFORM NUMERIC SIGN ONE N51 FLAT;N1;0;L;1;N;
1266D;CUNEIFORM NUMERIC SIGN TWO N51 FLAT;N1;0;L;2;N;
1266E;CUNEIFORM NUMERIC SIGN THREE N51 FLAT;N1;0;L;3;N;
1266F;CUNEIFORM NUMERIC SIGN FOUR N51 FLAT;N1;0;L;4;N;
12670;CUNEIFORM NUMERIC SIGN FIVE N51 FLAT;N1;0;L;5;N;
12671;CUNEIFORM NUMERIC SIGN SIX N51 FLAT;N1;0;L;6;N;
12672;CUNEIFORM NUMERIC SIGN SEVEN N51 FLAT;N1;0;L;7;N;
12673;CUNEIFORM NUMERIC SIGN EIGHT N51 FLAT;N1;0;L;8;N;
12674;CUNEIFORM NUMERIC SIGN NINE N51 FLAT;N1;0;L;9;N;
12675;CUNEIFORM NUMERIC SIGN ONE N34 FLAT TENU;N1;0;L;1;N;
12676;CUNEIFORM NUMERIC SIGN ONE N04 FLAT;N1;0;L;1;N;
12677;CUNEIFORM NUMERIC SIGN TWO N04 FLAT;N1;0;L;2;N;
12678;CUNEIFORM NUMERIC SIGN THREE N04 FLAT;N1;0;L;3;N;
12679;CUNEIFORM NUMERIC SIGN FOUR N04 FLAT;N1;0;L;4;N;
1267A;CUNEIFORM NUMERIC SIGN FIVE N04 FLAT;N1;0;L;5;N;
1267B;CUNEIFORM NUMERIC SIGN ONE N19 FLAT;N1;0;L;1;N;
1267C;CUNEIFORM NUMERIC SIGN TWO N19 FLAT;N1;0;L;2;N;
1267D;CUNEIFORM NUMERIC SIGN THREE N19 FLAT;N1;0;L;3;N;
1267E;CUNEIFORM NUMERIC SIGN FOUR N19 FLAT;N1;0;L;4;N;
1267F;CUNEIFORM NUMERIC SIGN FIVE N19 FLAT;N1;0;L;5;N;
12680;CUNEIFORM NUMERIC SIGN SIX N19 FLAT;N1;0;L;6;N;
12681;CUNEIFORM NUMERIC SIGN SEVEN N19 FLAT;N1;0;L;7;N;
12682;CUNEIFORM NUMERIC SIGN EIGHT N19 FLAT;N1;0;L;8;N;
12683;CUNEIFORM NUMERIC SIGN NINE N19 FLAT;N1;0;L;9;N;
12684;CUNEIFORM NUMERIC SIGN ONE N46 FLAT;N1;0;L;1;N;
12685;CUNEIFORM NUMERIC SIGN TWO N46 FLAT;N1;0;L;2;N;
12686;CUNEIFORM NUMERIC SIGN ONE N36 FLAT;N1;0;L;1;N;

```

2.3.2 Line_Break

Attached: [LineBreak.txt](#).

```

12550..12686 ; AL # N1 [311] CUNEIFORM NUMERIC SIGN ONE N01..CUNEIFORM NUMERIC SIGN ONE N36
↳ FLAT

```

2.3.3 Script

Attached: [Scripts.txt](#).

```

12550..125A7 ; Cuneiform # N1 [88] CUNEIFORM NUMERIC SIGN ONE N01..CUNEIFORM NUMERIC SIGN
↳ FIVE N54
1264C..12686 ; Cuneiform # N1 [59] CUNEIFORM NUMERIC SIGN ONE N01 FLAT..CUNEIFORM NUMERIC
↳ SIGN ONE N36 FLAT
125A8..1264B ; Proto_Cuneiform # N1 [164] CUNEIFORM NUMERIC SIGN ONE N56..CUNEIFORM NUMERIC
↳ SIGN THREE N07B

```

2.3.4 Script_Extensions

Attached: [ScriptExtensions.txt](#).

```

12550..12586 ; Pcus Xsux # N1 [55] CUNEIFORM NUMERIC SIGN ONE
↳ N01..CUNEIFORM NUMERIC SIGN FIVE N50
1258C..1258D ; Pcus Xsux # N1 [2] CUNEIFORM NUMERIC SIGN ONE
↳ N22..CUNEIFORM NUMERIC SIGN TWO N22
1259A..125A7 ; Pcus Xsux # N1 [14] CUNEIFORM NUMERIC SIGN ONE
↳ N51..CUNEIFORM NUMERIC SIGN FIVE N54

```

2.3.5 Block

Attached: [Blocks.txt](#).

```

12550..1268F; Archaic Cuneiform Numerals

```

3 Rationale for curviform–cuneiform disunification

The numbering systems that use cuneiform numerals are descended from the ones that use curviform numerals, and many of the cuneiform signs have clear curviform counterparts across this transition. Co-occurrences are sometimes described by analogy to distinctions that are not the realm of plain text, as in [Pow72, p. 215] “in the same fashion as we use black and red ink”; however, we must bear in mind that such analogies are not made in the context of character encoding discussions. In 2004, the curviform numerals were deemed unencodable for the time being; however, closer inspection reveals that the distinction functions less like markup than was argued at the time, and that the unification is problematic.

3.1 The cuneiform encoding model

As outlined in, *e.g.*, [UTR56], the cuneiform encoding model is diachronic; each character may have wildly different glyphs depending on time period and region. For instance, the sign IM may resemble  in texts from Early Dynastic IIIa Šuruppag as in the character code charts,  later in the third millennium⁶,  in Old Babylonian cursive,  in Neo-Assyrian, but is always encoded as U+1214E CUNEIFORM SIGN IM.

This encoding model allows for the interoperable representation of editions of diachronic reference works such as sign lists⁷ and dictionaries⁸, and of composite texts⁹. By being compatible with similarly diachronic transliteration practice, *i.e.*, by avoiding distinctions finer than those made in transliteration, the encoding model also allows for automated conversion of transliterated corpora to cuneiform, which has proven useful as a processing step in analyses such as [Rom24; JJ24]¹⁰. The diachronic approach is also useful for pedagogic applications¹¹.

3.2 Arguments for curviform–cuneiform unification

In this context, the argument was made in [L2/04-099], as part of discussion of the cuneiform encoding¹² that the curviform numerals, which occasionally appear in the Ur III period and are used heavily in the Early Dynastic period, were a stylistic distinction unifiable with the cuneiform digits, and that an archaizing Ur III font or an Early Dynastic font could have curviform glyphs for the appropriate characters.

Some co-occurrence of curviform and cuneiform digits was known and acknowledged. [L2/04-099, p. 3] cites [NDE93, p. 62], which is a copy of [P020054], an Early Dynastic IIIb administrative tablet from Nirsu. The excerpt cited, lines 1–3 of column 1 of the obverse, is as follows:

⁶Merging with U+1224E CUNEIFORM SIGN NI2.

⁷Notably [OSL] and the online edition of [Bor10] in [eBL, Signs].

⁸Notably [ePSD2] and the online edition of [Sch10] in [eBL, Dictionary].

⁹For example, there are Neo-Assyrian and Neo-Babylonian copies of parts of the laws of , as well as Old Babylonian copies in both archaizing and cursive styles. Because of damage on the stele [P249253], some sections are known only from those copies. See [Oel22, pp. 110 sqq.].

¹⁰Attendees may recall the summary given on the third day of UTC #180, as recorded in [L2/24-159]. Other readers may refer to [Svā+24, pp. 242, 148].

¹¹For instance, Old Babylonian grammar may be taught in the Neo-Assyrian script, as in [Cap02].

¹²At that time scoped to the repertoire of the Ur III period and later, see [L2/03-162, p. 1], although many disunifications, such as  ≠ , were informed by Early Dynastic distinctions.

						
1(ḡeš ₂)	1(u)	1/2(diš)	5(diš <i>tenû</i>)	gi	us ₂	sa ₂
	7.5 (ropes)		5	reed	side	equal
						
3(u)	6(diš <i>tenû</i>)	gi	saḡ	sa ₂		
3 (ropes)	6	reed	front	equal		
						
ašag-bi	1(bur ₃ ^c)	1(eše ₃ ^c)	1(iku ^c)	1/2(iku ^c)		
ašag=bi						
field=DEM ¹⁵						

   
 tug_x(LAK 483)-si-ga-kam
 tugsiga =ak =am -Ø
 ploughed=GEN=COP-3.SG.S

The argument made in [L2/04-099, p. 4] is that this is comparable to a stylistic distinction such as¹⁶

465 metres, equal lengths
 198 metres, equal widths
 this field is 9, 18 hectares of ploughed land

where the numerals have the same structure ([L2/04-099] contrasts this to the different structures of ASCII digits and roman numerals). That document further claims that “the number signs do not normally carry in their individual signs the meaning of what they are used to measure”, and that curviform and cuneiform numerals “are not normally mixed together in a single numerical expression”, noting the exceptions of [P232278; P232280]. In addition, [L2/04-099, p. 4] points out that the cuneiform numeric signs are descended from the curviform ones (this is undisputed), and claims there is only a small re-allocation of the function of signs (from  to  numerals). It therefore comes to the conclusion that the use of curviform numerals should be seen as a formatting distinction, rather than one that should be represented in plain text, and insists that the encoding should capture the lineal historical descent of those signs, presumably to take advantage of the benefits of diachronic encoding described in §3.1.

Although they had been part of the preliminary proposal [L2/03-393R], the curviform numerals were therefore removed from [L2/04-036] and [L2/04-189], which both state that “The distinction between curved numerals and their cuneiform descendants is treated as glyphic for the purposes of the present proposal; this issue will need to be revisited in subsequent encoding phases¹⁷.”

¹³As noted in [Pow87, p. 466], this sign has a very short “tail” in this period, so that it is wider than it is tall, and can at first seem like a large — in copies. The photos in [CDL] clearly show that this is in fact a vertical wedge.

¹⁴Note that ED IIIb < numerals have a somewhat different appearance from those of the Ur III period used in this transcription; the sign  in [P020054] looks more like Ur III .

¹⁵Alternatively: area=POSS.3.SG.NH, “its area”.

¹⁶We have taken the liberty of adjusting the analogy to use measures approximately equal to those in [P020054], instead of a field of five by twenty-five metres.

¹⁷The cuneiform encoding process was planned in *stages* in [L2/03-162]. One might expect the second stage of encoding, which led to the creation of the Early Dynastic Cuneiform block, to incorporate the

The time has come to revisit this issue. As we will see in §3.3, numerals can only be interpreted in the context of what they measure, *i.e.*, as part of a metrological system. In §3.4 we will see that in some periods:

- the functions and use of the numerals vary beyond the mere \triangleright / \lrcorner switch;
- the contrast between curviform and cuneiform numerals is commonly used to distinguish metrological systems;
- some metrological systems commonly mix curviform and cuneiform in single numerical expressions.

3.3 A primer on classic Ur III and Old Babylonian metrologies



 I want to write tablets: the tablet of
 1 cor of barley to 600 cor; the tablet
 of 1 shekel of silver to 10 minas [...]

Edubba'a D¹⁸

Before diving into the usage of the curviform numerals in the Early Dynastic period to explain the contrast with cuneiform numerals, it is useful to understand the usage of the already-encoded characters in the Ur III and Old Babylonian periods.

As is well known¹⁹ a sexagesimal place value system (SPVS) was used in Mesopotamia from the late third millennium onwards. One should bear in mind, however, that other systems were used; the SPVS was primarily used in calculations, with results being expressed in non-positional systems [Rob08, p. 76; Rob22]. The digits 1–59 of the SPVS have inner structure which is reflected in the encoding: the digits 1–9 are the individual characters \lrcorner - \llcorner , the multiples of ten (10–50) are \llcorner - \llcorner , but the other digits 11–59 are sequences \llcorner - \llcorner - \llcorner ; in effect the base-sixty digits are themselves written in base ten, with a different set of symbols for the tens place. This reflects the origin of the sexagesimal place value system; it derives from a *non-positional* system, hereafter the *cuneiform discrete counting system* $S_{\text{Ur III/OB}}$, which had different signs for the units \lrcorner - \llcorner , tens \llcorner - \llcorner , sixties \lrcorner - \llcorner (with larger wedges than the units), multiples of six hundred \llcorner - \llcorner , multiples of three thousand six hundreds \llcorner - \llcorner - \llcorner - \llcorner , and multiples of thirty-six thousand \llcorner - \llcorner - \llcorner - \llcorner .

3.3.1 The discrete counting system

The relations between the values of the signs in the cuneiform discrete counting system may be summarized by the following factor diagram²⁰, where the number over arrow indicates the multiple of the preceding sign (right of the arrow)

numerals needed for the representation and discussion of Early Dynastic texts; however, the proposal [L2/12-208] stated that “numerals have been omitted due to the complexity of numeral signs from this period. An expert in the metrology of this period must be consulted before these can be properly included.”

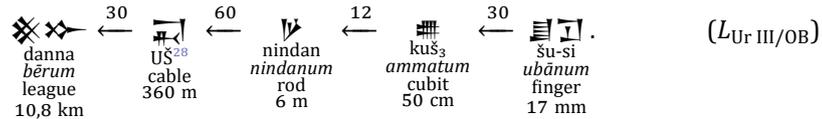
¹⁸See [Civ85].

¹⁹See, *e.g.*, [Unit6, §22.3.3, sub “Cuneiform Numerals”].

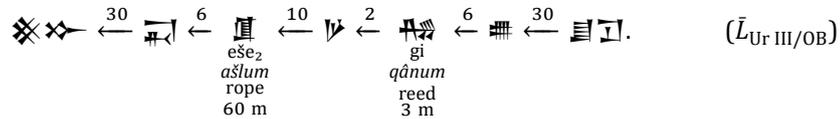
²⁰These diagrams, which have become standard in discussions of Mesopotamian metrology, originate with [Fri78, p. 10], where they are called *step-diagrams*, see Figure 4.

3.3.4 The length system

In the Ur III and Old Babylonian periods, lengths are expressed using overt units counted with \uparrow and \leftarrow numerals with their system $S_{\text{Ur III/OB}}$ values. Since it does not have any unusual numerals, this system would not in itself be of much relevance to character encoding, but we present it here as background for its Early Dynastic counterpart presented in §3.4. Metrological tables use the following units²⁷ [Fri07, p. 118; Rob19]:



Two more units appear occasionally [Pow87, p. 459; Fri07, p. 118; Rob19]:



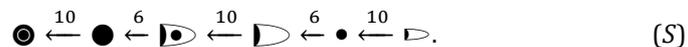
In addition, there are Akkadian names for the half-rope and half-reed, see [Pow87, pp. 463 sq.].

3.3.5 Fractions

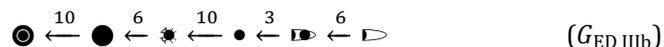
Fractions of the *ikīm*, $\searrow = \frac{1}{2}$ and $\swarrow = \frac{1}{4}$, have already been encountered. In other contexts, the fraction $\frac{1}{2}$ is written \uparrow , as in $\uparrow \leftarrow$. The fractions $\frac{1}{3}$ and $\frac{2}{3}$ are written \downarrow and \downarrow . The latter two signs are derived from curviform signs \curvearrowright and \curvearrowleft , which are already separately encoded; these are in turn derived from the sign \downarrow (ŠU_2), whose Early dynastic form resembles \downarrow , and \curvearrowright numerals; see [Pow71, pp. 113, 134]. The \downarrow is sometimes omitted, as in [P240545, verso 6 9; P221530; P221531; P271238; P274845].

3.4 Curviform numerals in early metrologies

At first sight, the metrological systems from the Early Dynastic period resemble the ones previously mentioned. In particular, the discrete counting system used in the Early Dynastic period (and earlier in the fourth millennium) clearly mirrors system $S_{\text{Ur III/OB}}$ [Fri07, p. 374; DE87, pp. 127, 165]:



Likewise the area system used in the Early Dynastic IIIb period for areas of one iku and greater [Dei22, p. 72; NDE93, p. 63; Fri07, p. 378; Lec16],



²⁷In this factor diagram and the next, we do not include the numerals. The units are no more than a factor of 60 apart, so higher numerals such as \uparrow or \leftarrow are not used.

²⁸As indicated by the capitalization, the reading of this sign is unknown; see [Pow87, pp. 465 sqq.] for a discussion of various hypotheses.

mirrors system $G_{Ur III/OB}$, with consistent use of the numerals: \bullet corresponds to \triangleleft , \bullet to \diamond , and \odot to \diamond . An exception to this correspondence, noted in [L2/04-099, p. 4] (see §3.2), is that the vertical \uparrow from $S_{Ur III/OB}$ corresponds to a horizontal \triangleright in system S . This is however far from the only case of such a reallocation of function. The earlier form of the area system is [DE87, pp. 141, 165; Fri07, p. 378]:

$$\bullet \xleftarrow{6} \odot \xleftarrow{10} \bullet \xleftarrow{3} \blacktriangleright \xleftarrow{6} \triangleright, \tag{G}$$

Observe that, as noted in [DE87, p. 142], \odot changes meaning from $10\bullet$ in system G to $600\bullet$ in system $G_{ED IIIb}$. System G is used in the fourth millennium, but also in the ED I-II period (it is the “area 2” system in [Cha03], whereas $G_{ED IIIb}$ is the “area 1” system).

Another example of nontrivial correspondence between cuneiform and curvi-form numerals may be found by comparing the fractions the Early Dynastic IIIb area system²⁹,

$$\odot \xleftarrow{10} \bullet \xleftarrow{6} \blacktriangleright \xleftarrow{10} \bullet \xleftarrow{3} \blacktriangleright \xleftarrow{6} \triangleright \xleftarrow{2} \triangleright \xleftarrow{2} \triangleleft \xleftarrow{2} \blacktriangleright^{30}, \tag{G_{ED IIIb}}$$

with the numerals of a contemporaneous capacity system:

$$\blacktriangleright \xleftarrow{10} \triangleright \xleftarrow{6} \bullet \xleftarrow{10} \triangleright \xleftarrow{4} \triangleright \xleftarrow{6} \blacktriangleright, \tag{C_{\text{gur san } \eta a_2}}}$$

$\text{gur san } \eta a_2$

both described in [Lec16]. While the size of the $\text{gur san } \eta a_2$ (gur san ηa_2) in bariga is different from that of the Old Babylonian gur , the basic structure of the capacity system is recognizable, with \triangleright corresponding to \uparrow for bariga, \blacktriangleright - \blacktriangleright corresponding to \uparrow - \uparrow for ban₂, and the gur counted with \triangleright rather than \blacktriangleright numerals. However, the half-iku is counted with the same \triangleright as the bariga, whereas it uses a different sign, \blacktriangleright , in the Old Babylonian system. As we will see, this is cannot be handled as a split, by giving \blacktriangleright the glyph \triangleright in an Early Dynastic IIIb font, as the \blacktriangleright numeral series is also in use in that period.

3.4.1 Field lengths in Nirsu

The length system of the Early Dynastic IIIb state of Lagaš is of particular interest. As described in [Pow87, p. 466; Lec20, pp. 289 sq.], lengths are expressed in rods, but the unit sign \blacktriangleright is generally omitted; in addition, only tens of rods are used; these are equal to one rope, but the sign gur is not written either. Lengths shorter than one rope are expressed in half-rope using the $\frac{1}{2}$ sign \uparrow (again with no gur), and then in reeds, with the sign gi , as follows:

$$\uparrow \xleftarrow{6} \blacktriangleright \xleftarrow{2} \uparrow \xleftarrow{10} \text{gi}^{31}, \tag{L_{ED IIIb}}$$

$\frac{1 \text{ eše}_2 = 10 \text{ nindan}}$
 $\frac{1 \text{ rope} = 10 \text{ rods}}$
 60 m

$\frac{1 \text{ gi}}{\text{reed}}$
 3 m

This is the system that was used to express the sides of the field in [P020054] discussed in §3.2. In that tablet and most others from the same period, such as the

²⁹A variant is $\odot \xleftarrow{10} \bullet \xleftarrow{6} \blacktriangleright \xleftarrow{10} \bullet \xleftarrow{3} \blacktriangleright \xleftarrow{6} \triangleright \xleftarrow{2} \triangleright \xleftarrow{2} \blacktriangleright \xleftarrow{2} \blacktriangleright$, see [Pow72, p. 218].

³⁰The (fairly rare) cuneiform counterpart is \blacktriangleright .

³¹The reeds are counted using *tenû* numerals, \blacktriangleright , \blacktriangleright , \blacktriangleright , etc.

numerals for \aleph [Fri78, p. 43; Lec16]:

$$\underbrace{\begin{array}{c} \text{10} \\ \leftarrow \text{D} \end{array}}_{\text{𐎠𐎡𐎢𐎣}} \leftarrow \begin{array}{c} \text{6} \\ \leftarrow \bullet \end{array} \leftarrow \begin{array}{c} \text{10} \\ \leftarrow \text{D} \end{array} \leftarrow \begin{array}{c} \text{4} \\ \leftarrow \text{v} \end{array} \leftarrow \begin{array}{c} \text{6} \\ \leftarrow \text{𐎠} \end{array} \leftarrow \begin{array}{c} \text{6} \\ \leftarrow \text{𐎠} \end{array} \leftarrow \text{𐎡} \end{array}, \quad (C_{\text{𐎠𐎡𐎢𐎣}})$$

as in [P020016, rev. 1 4; P020065; P020090, obv. 1 3, rev. 2 1; P020092, rev. 3 1; P020137, obv. 1 2] and others, where ban_2 counted with 𐎠 numerals are followed by sil_3 counted with 𐎡 numerals. Curviform numerals are also used to count sil_3 , but not³⁹ as part of the 𐎠 systems. This contrast can be seen in [P220927], which measures butter (𐎠 , i_3) with a different capacity system, using the 𐎠 (dug, “pot”) of 20 \aleph , with D and \bullet numerals⁴⁰ for both the 𐎠 and the \aleph , thus [Pow87, pp. 504 sq.]

$$\underbrace{\begin{array}{c} \text{10} \\ \leftarrow \text{D} \end{array}}_{\text{𐎠}} \leftarrow \begin{array}{c} \text{2} \\ \leftarrow \bullet \end{array} \leftarrow \begin{array}{c} \text{10} \\ \leftarrow \text{D} \end{array} \leftarrow \begin{array}{c} \text{3} \\ \leftarrow \text{𐎠} \end{array} \leftarrow \begin{array}{c} \text{2} \\ \leftarrow \text{𐎠} \end{array} \leftarrow \text{𐎡}, \quad (C_{\text{𐎠}})$$

but counts cheese (𐎠 , ga’ar) using the 𐎠𐎡𐎢𐎣 capacity system, with 𐎡 numerals for the \aleph .

Another capacity system in ED IIIb Nirsu is the 𐎠𐎡𐎢𐎣 , the gur of two ul [Lec16]:

$$\underbrace{\begin{array}{c} \text{10} \\ \leftarrow \text{D} \end{array}}_{\text{𐎠𐎡𐎢𐎣}} \leftarrow \begin{array}{c} \text{2} \\ \leftarrow \text{v} \end{array} \leftarrow \begin{array}{c} \text{6} \\ \leftarrow \text{𐎠} \end{array} \leftarrow \begin{array}{c} \text{6} \\ \leftarrow \text{𐎠} \end{array} \leftarrow \text{𐎡}. \quad (C_{\text{𐎠𐎡𐎢𐎣}})$$

Here the $\text{D}-\text{𐎡}-\text{v}$ contrast occurs not only within the numerals of the system, but with its units; this is perhaps best illustrated by the expressions 𐎠𐎡𐎢𐎣 𐎠𐎡𐎢𐎣 𐎠𐎡𐎢𐎣 \bullet 𐎠𐎡𐎢𐎣 𐎠𐎡𐎢𐎣 in [P221746, rev. 2 2] and 𐎠𐎡𐎢𐎣 𐎠𐎡𐎢𐎣 \bullet 𐎠𐎡𐎢𐎣 𐎠𐎡𐎢𐎣 in [P221814, rev. 1 5].

3.4.4 Grain in Ebla

The mixing of curviform and cuneiform numerals within a metrological system is not specific to Nirsu.

³⁹As of this writing, the single occurrence of (ban2@c) followed by curviform numerals and sil_3 in ED IIIb Nirsu transliterations on [CDLI], 4(ban2@c) 3(asz@c) sil_3 in [P221815, obv. 4 7], is incorrect: it should be 4(ban2@c) 3(disz@t) sil_3 .

⁴⁰This tablet also uses subtractive notation: 𐎠𐎡𐎢𐎣 𐎠𐎡𐎢𐎣 𐎠𐎡𐎢𐎣 “two pots minus two thirds (sil_3)”, \bullet 𐎠𐎡𐎢𐎣 𐎠𐎡𐎢𐎣 𐎠𐎡𐎢𐎣 “ten minus one pots, six sil_3 ”. Such subtractive notation is common in most of the metrological systems discussed here; it appears in the ED IIIa period [Rob08, p. 77]. It presents no complexity for character encoding, but it is noteworthy that the sign 𐎠 (lal, “minus”) is often ligated with the following numerals, with the subtrahend placed under a sometimes considerably enlarged 𐎠 , similar to the layout of the radical in modern mathematical notation, see, e.g., [P020092, rev. 3 1, 2]. A good font could handle the very common -1 case, perhaps even -2 and -3 ; setting arbitrary numeric expressions under the 𐎠 , or more generally replicating the layout of Early Dynastic tablets, is outside the realm of plain text; see also §6.3.

sions also. In example 6, the writing  may imply a reading /š a n a b i/,¹ whereas  in example 11 should be read */š u š a n a m i n/. Moreover, the question must be raised as to whether such writings as $\langle \text{U} \rangle \langle \text{B} \rangle$ k ù - b a b b a r + š a - a a² do not perhaps imply a linguistic resolution of */š u š a n a m i n/ rather than /š a n a b i/. I see no way of answering this question at present, but it is one which one

Figure 2: Discussion of the readings of proposed  and  as well as already-encoded  and  in [Pow71, p. 138].

iku fractions		
Girsu type	"BIN 8" type	Ur III type
 = :f.o.o	 = :p.o.o	 = :m.o
 = :o.g.o	 = :o.q.o.	 = :o.n
 = :o.o.h	 = :o.o.r	

Figure 3: A transliteration system for the fractions of the iku in [Pow72, p. 216].

1 "big cup" = 3 "big disks". Hence we can infer from the two ŠE-texts BIN 8,4 and BIN 8,5 together, that the "ŠE-system" makes use of number signs whose values are related to each other through the equations

$$1\text{U} = 3\text{O}, 1\text{O} = 10\text{o}, 1\text{o} = 6\text{v}, 1\text{v} = ?\text{Q}$$

A more convenient way of saying the same thing is to write out the "steps" between the various ŠE-units in what we shall call a "step-diagram" for the "ŠE-system":

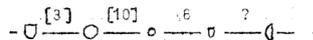


Figure 4: The first factor diagram, in [Fri78, p. 10].

$$\begin{cases} 4\bar{\cup} 5\bullet = 24\bar{\cup} 3\bullet & \text{(C 234)} \\ 5\bar{\cup} 1\bullet 1\bar{\cup} = 5\bar{\cup} 7\bullet & \text{(C 314)} \\ 1\bar{\cup} 1\bar{\cup} 1\bar{\cup} 1\bar{\cup} = 6\bullet 2\bar{\cup} 1\bar{\cup} & \text{(C 27)}. \end{cases}$$

These metrological equations for the "unknowns" $\bar{\cup}$, \bullet , $\bar{\cup}$, etc., can be treated exactly as ordinary equations for unknowns x, y, z, \dots . In particular, the equations can be simplified by subtraction of equal amounts from both sides of the identities. In this way the three equations above can be reduced to:

$$\begin{aligned} 2\bullet &= 20\bar{\cup} && (4\bar{\cup} 3\bullet \text{ subtracted from both sides}) \\ 1\bar{\cup} &= 6\bullet && (5\bar{\cup} 1\bullet \text{ - " = } \quad \quad \quad) \\ 1\bar{\cup} &= 6\bullet 1\bar{\cup} 9\bar{\cup} && (1\bar{\cup} 1\bar{\cup} \text{ - " - } \quad \quad \quad) \end{aligned}$$

We can now read off from the first equation that $1\bullet = 10\bar{\cup}$, and from the second that $1\bar{\cup} = 6\bullet$. Then the third equation can be simplified (by "substitution" of these values into the equation), to the following reduced form:

$$1\bar{\cup} = 2\bar{\cup} 9\bar{\cup}.$$

The most likely solution to this last equation is, of course,

$$1\bar{\cup} = 2\bar{\cup}, \quad 1\bar{\cup} = 10\bar{\cup}.$$

Figure 5: Derivation of the factors of the bisexagesimal system in [Fri78, p. 15]⁵⁸.

⁵⁸The bisexagesimal system is used alike in proto-Elamite and proto-cuneiform texts, see [Fri78, p. 38]; the derivation in [Fri78, p. 15] is based on proto-Elamite artefacts. There is a typo in the equation for C 27: the right-hand side should have $10\bar{\cup}$ rather than $1\bar{\cup}$, otherwise nothing could be deduced about $\bar{\cup}$. Note that in Friberg's early works [Fri78; Fri79; Fri86; Fri87], copies of fourth millennium and sometimes third millennium tablets are shown as vertical text (which they were for the scribes), and their numerals are written within horizontal text in the same orientation that they have if the tablet is taken as vertical text; in [UAX50] parlance, as if they had Vertical_Orientation=Upright. In addition, they are listed in these equations in the horizontal order in which they appear as vertical text (thus the rightmost numeral is the most significant, read first). Cuneiform is correctly Vertical_Orientation=Rotated, consistently both with modern practice and with the rotation between earlier vertical and later horizontal monumental inscriptions. Friberg's early conventions are not followed in later scholarship, and are abandoned in his own more recent works, such as [Fri07]; a more typical way to express the first equations might be

$$\begin{aligned} 5\bullet + 4\bar{\cup} &= 3\bullet + 24\bar{\cup} && \text{(C 234)} \\ 1\bar{\cup} + 1\bullet + 5\bar{\cup} &= 7\bullet + 5\bar{\cup} && \text{(C 314)} \\ 1\bar{\cup} + 1\bar{\cup} + 1\bar{\cup} &= 10\bar{\cup} + 2\bar{\cup} + 6\bullet && \text{(C 27)} \end{aligned}$$

A diplomatic edition of [Fri78] could rotate the numerals using a higher-level protocol:

$$\begin{cases} 4\bar{\cup} 5\bullet = 24\bar{\cup} 3\bullet & \text{(C 234)} \\ 5\bar{\cup} 1\bullet 1\bar{\cup} = 5\bar{\cup} 7\bullet & \text{(C 314)} \\ 1\bar{\cup} 1\bar{\cup} 1\bar{\cup} = 6\bullet 2\bar{\cup} 1\bar{\cup} & \text{(C 27)}. \end{cases}$$

Thus, for instance, the original set of fractions ∇ , \triangleleft , and \blacktriangleright (1/2, 1/4 and 1/8 of an iku) in the Sumerian GANA system, was after a time augmented through the addition of the new sub-unit SAR: 𒊕 , equal to 1/100 of an iku (∇). Similarly, the Sumerian weight unit "ma-na" which originally may have had only the sub-units 𒌦 ša-na (= 1/3 mana) and 𒌦𒌦 ša-na-bi (= 2/3 mana), and perhaps also gin: 𒄠 (= 1/60 mana), seems to have acquired, at some time or other, also the smaller sub-units 𒄠𒌦 (= 1/3 gin), and 𒄠𒌦𒌦 = še (= 1/3 × 1/60 gin).

Figure 6: Discussion of proposed fractions ∇ , \triangleleft , \blacktriangleright , and 𒊕 , as well as already-encoded 𒌦 and 𒌦𒌦 in [Fri78, p. 49].

stein publizierten Zeichenliste enthalten ist³, bis vor kurzem unentdeckt bleiben konnte. Erst 1978 machte der schwedische Mathematiker J. Friberg, ERBM I, 9-11, darauf aufmerksam, daß die Zeichen für die Zahlen Eins (∇) und Zehn (\bullet) in Verbindung mit dem Zeichen ŠE nicht im Verhältnis 1 zu 10 sondern im Verhältnis 1 zu 6 stehen. Bis dahin hatte man, obwohl die Andersartigkeit des in Verbindung mit dem Zeichen ŠE verwendeten Zahlzeichensystems bekannt war, für diese beiden häufigsten Zahlzeichen einheitlich ein Verhältnis 1 zu 10 unterstellt, obwohl es mehrere eindeutige Gegenbelege gab, von denen zumindest diejenigen der Archaischen Texte aus Gœmet Nasr bereits früh publiziert und jedermann zugänglich waren⁴. Als Folge

Figure 7: Discussion in [DE87, p. 117] of the discovery in [Fri78, pp. 9–11] (see Figure 4) of the different relations between ∇ and \bullet in systems G and S.

there is in any case an important qualitative difference between IX for Latin novem and \bullet for Sumerian niš. niš seems to be a primary numberword requiring, in a system depicting Sumerian numeration, a differentiated representation comparable

Figure 8: The sign \bullet used in a parallel with IX in [Eng88, pp. 131–133 n. 9], discussing an argument from [Pow72, p. 172] on the question of the language of the Uruk III texts.

of decreasing fractions $1/n$ of this measure, whereby "n" was determined by the number of oblique impressions made by the rounded end of a thin stylus around a central point in a specific sign. Thus $\text{𒌦} = 1/2 N_{30}$, $\text{𒌦𒌦} = 1/3 N_{30}$, and so on. The first sign of the latter units, N_{34} ,

Figure 9: Description of the fractions 𒌦 and 𒌦𒌦 in [Eng98, p. 113]⁵⁹.

For instance, the first line contains the notations $1N_{34} 1N_{30}$; $2N_{20}$, which can be translated "60 of the (grain rations containing) 𒌦 (of grain); (grain involved): 2 \bullet (of ground barley)". This calculation contradicts the assumed numerical relationship $10N_1 = 1N_{14}$, since as was well known the measure represented by the sign N_{30} was $1/5$ of that represented by N_1 , so that $60 \times 1/5 = 12$ and not 20, as $2N_{14}$ would imply. Instead of relying on complicated

Figure 10: The sign 𒌦 used as a capacity measure within otherwise translated text in [Eng98, p. 116].

⁵⁹The text erroneously has N_{34} instead of N_{24} .

Die halbkreisförmigen Griffleindrücke gehen manchmal in mehr oder weniger eckige Formen über (⌒)⁶⁵. Es gibt aber auch Einer in Form von regelrechten – meist mehr oder weniger schräggestellten – Keilen (⌋), die öfters neben halbrunden Einern vorkommen und mit diesen kontrastieren⁶⁶. Selten treten mit ⌒ gebildete Zahlen auf⁶⁸⁷ (sie entsprechen den bariga-Zahlen im Hohlmaßsystem, s.u. 7.4).

Figure 11: Discussion of co-occurrences and contrasts between ⌋ , ⌒ , and ⌒ in [Kreg98, p. 303].

The calculations:

Obv. i	1	$60 \times \frac{1}{5} \text{⌒}$ (⌒)	=	$12 \times \text{⌒}$	=	$2 \times \bullet$
	2	$120 \times \frac{1}{10} \text{⌒}$ (⌒)	=	$12 \times \text{⌒}$	=	$2 \times \bullet$
	3	$120 \times \frac{1}{15} \text{⌒}$ (⌒)	=	$8 \times \text{⌒}$	=	$1 \times \bullet$ $2 \times \text{⌒}$
	4	$300 \times \frac{1}{20} \text{⌒}$ (⌒)	=	$15 \times \text{⌒}$	=	$2 \times \bullet$ $3 \times \text{⌒}$
	5	$600 \times \frac{1}{25} \text{⌒}$ (⌒)	=	$24 \times \text{⌒}$	=	$4 \times \bullet$
Rev. i	1	1200		$1 \times \bullet$	$1 \times \bullet$	$5 \times \text{⌒}$
Obv. i	6	$6000 \times \frac{1}{30} \text{⌒}$ (GAR+6N ₅₇)	=	$200 \times \text{⌒}$	=	$1 \times \text{⌒}$ $3 \times \bullet$ $2 \times \text{⌒}$
ii	1	$120 \times \approx \frac{1}{4} \text{⌒}$ (DUG ₅ +U ₂₅)	=	$30 \times \text{⌒}$	=	$5 \times \bullet$ $1 \times \text{⌒}$ $1 \times \text{⌒}$
	2	$180 \times \frac{1}{5} \text{⌒}$ (DUG+AS ₃)	=	$36 \times \text{⌒}$	=	$6 \times \bullet$
	3	$300 \times \frac{1}{15} \text{⌒}$ (KAS ₃)	=	$20 \times \text{⌒}$	=	$3 \times \bullet$ $2 \times \text{⌒}$
Rev. i	3	600		$1 \times \bullet$	$4 \times \bullet$	$3 \times \text{⌒}$ $1 \times \text{⌒}$
				$1 \times \bullet$	$1 \times \bullet$	$5 \times \text{⌒}$
				$1 \times \text{⌒}$	$3 \times \bullet$	$2 \times \text{⌒}$
				$1 \times \bullet$	$4 \times \bullet$	$3 \times \text{⌒}$ $1 \times \text{⌒}$
Grand total of groats used:				$1 \times \text{⌒}$	$2 \times \bullet$	$9 \times \bullet$ $4 \times \text{⌒}$ $1 \times \text{⌒}$
Grand total of malt used:				1N_{47} 4N_{20} 3N_5 1N_{42a} (rev. i 3) $\times \frac{3}{5} \approx$	$8 \times \bullet$	$4 \times \text{⌒}$ $1 \times \text{⌒}$

Figure 6. Transliteration and calculations of MSVO 4, 66.

Figure 12: Calculations from [P005468] transcribed in [Engo1, p. 132] using modern mathematical notation combined with some of the proposed characters.

strong similarities between “area” 1 and “area” 3 systems, the sign with two concentric discs (⦿ , notated N₅₀²⁷) remains problematic. It never appears in any numerical combination with the sign with a single disc (● ,

Figure 13: Discussion of ⦿ and ● ⁶⁰ in [Cha03, p. 6].

⁶⁰The statement that these do not co-occur refers to the texts from ED I-II Ur; these signs co-occur both earlier and later in areas, with different relations as previously discussed.

shape. The principle of notation is additive: each sign is noted as many times as necessary (e.g.,  transliterated as 2(šar₂) 1(geš'u) 3(u), means 2 × 3600 + 1 × 600 + 3 × 10). The system is based on an alternation of factors ten and

Figure 19: Explanation of the structure of the number  in [Pro20, p. 350].

might think of one fabric and a half,¹¹ but the presence of notations with “2▷ 2▽”, “3▷ 3▽”, and “6▷ 6▽” (Fig. 1) elements excludes that one deals with fractions, as these notations are not consistent with those of Šuruppag’s weight measurement system.¹² The notation “1▷ gada” in o. ii 1 and r. vi 1, along with the total of “39



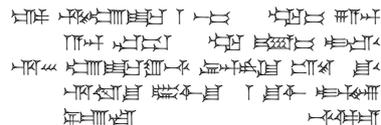
Fig. 1. Combinations of numerals attested in Š. 742.

Figure 20: Discussion of the contrast between ▷ and ▽ numerals in [Gor23, p. 162].

as, for example, in TM.75.G.3125 = ARET III 107 o. iv 1, “4▷ ṽa₃-da-um^{u9}-2 ṽ 4▽
aktum 4▷ib₂^{u9}×3 ṽ sa₆ gunu₃” (Fig. 2).

Figure 21: Transliteration in [Gor23, p. 163] of [P242293, recto 4 1] incorporating untransliterated numerals.

3.5 Non-numeric usage



The beginning of the scribal art is a single wedge. That one has six pronunciations; it also stands for ‘sixty’⁶³. Do you know its reading⁶⁴?

Examenstext A⁶⁵

Many of the cuneiform numerals are used with a logographic or phonetic value. For example, the sign  has, *inter alia*, the values aš, rum, and dili. While the horizontal numerals are most frequently written ▷ in the Early Dynastic period⁶⁶,

⁶³The reader will recall that ṽeš₂ is written ṽ, with a larger wedge than ṽ; however, these signs have merged by the time Examenstext A is composed.

⁶⁴Besides ṽeš₂, a look at [OSL] shows that the values diš, ge₃, makkaš, saṅtak₄, and tal₄ are attested both in [ePSD2] and in lexical lists. The sign is also used for the Akkadian word *ana* in the Neo-Assyrian period.

⁶⁵Translation from and composite text after [BLMS].

⁶⁶A [CDLI] search for "(asz@c)" finds 3296 ED texts, while a search for "(asz)" finds 81 ED texts, of which 46 also contain "(asz@c)".

such non-numeric usage is almost⁶⁷ always written 𐎶 , for instance:

- in personal names in administrative texts, such as the following, which all contain 𐎶 numerals:
 - 𐎶𐎠𐎶 ⁶⁸ in [P010424, rev. 1 5; P010458, obv. 1 5; P010459, obv. 2 5'] from ED IIIa أبو صلابيخ،
 - 𐎶𐎠𐎶 in [P010960, obv. 2 5] from ED IIIa Šuruppag,
 - 𐎶𐎠𐎶𐎶 in [P251641, obv. 4 3] from ED IIIb Adab,
 - 𐎶𐎠𐎶𐎶𐎶 in [P252866, obv. 2 3] from ED IIIb Adab,
 - 𐎶𐎠𐎶𐎶𐎶𐎶 in [P298637, rev. 2 4] from ED IIIb Umma;
- in the Sumerian word 𐎶𐎶 u_2 -rum, “property” in ED IIIb Nirsu administrative texts which contain 𐎶 numerals, such as [P020006, obv. 2 3; P020008, rev. 1 2; P020018, rev. 1 2; P020024, obv. 1 4; P020030, obv. 3 1];
- in lexical texts:
 - in the divine name 𐎶𐎠𐎶𐎶𐎶 𐎶𐎠𐎶 in the lexical texts [P010570, rev. 2 4; P010572, obv. 3 6], where the entries are prefixed with 𐎶 .
 - in the word 𐎶 dili, “small fish” in [P010578, obv. 2 5], witness to Early Dynastic Fish,
 - in the same word with a determinative, 𐎶𐎠𐎶 dili^{ku₆}, in [P010586, obv. 4 4, 6], witness to Early Dynastic Food, which starts with 𐎶 numerals.

This is a clear contrast between 𐎶 and 𐎶 in this period, and genuine ambiguity can arise if it is lost; for instance, the personal name 𐎶𐎠𐎶 occurs on its own line in the aforementioned administrative texts; a line 𐎶𐎠𐎶 would instead be read as “one slave”.

3.6 The limited benefits of diachronic encoding for numerals

The argument in favour of diachronic encoding is that it facilitates interoperability in a variety of use cases, as we have outlined in §3.1. While these benefits are real and now visible for cuneiform signs, similar considerations are not generally applicable to curviform numerals.

Diachronic reference works such as sign lists and dictionaries tend to not include numbers, or when they do, they treat them separately, and include signs such as 𐎶 that have both numeric and non-numeric values in both the main list and the section on numbers. For instance, [Sch35, pp. 123 sqq.] lists all of 𐎶 – 𐎶𐎶𐎶 together with 𐎶 – 𐎶𐎶𐎶 , while 𐎶 , 𐎶𐎶 , and 𐎶𐎶𐎶 , and only those, appear at the beginning of the sign list, since they have non-numeric values⁶⁹. [Cat13, p. 58] has the numeric signs 𐎶 , 𐎶 , 𐎶 , whereas non-numeric 𐎶 is at the beginning of the sign list, where its values *aš* and *rum* are listed. For signs with both non-numeric and numeric usage, [Dei22] writes *s. die Zahlz.* throughout the main list; LAK 1 𐎶 thus reappears at LAK 829 together with 𐎶 , 𐎶 , and 𐎶 . One should note [Bor10], which has numbers throughout the sign list; but that sign list does not show glyphs predating the Old Babylonian period, nor does it comprehensively cover the numerals used in the Ur III and Old Babylonian periods, as, for instance, it does not have 𐎶𐎶 – 𐎶𐎶𐎶 used in system $G_{\text{Ur III/OB}}$.

Composite texts rarely have witnesses both from the Early Dynastic period and later; the kinds of texts that do, chiefly lexical and literary texts, do not con-

⁶⁷Exceptions are discussed in §3.7.1.

⁶⁸Possibly a toponym, see [Pos, p. 195].

⁶⁹Non-numeric values of 𐎶 were discussed in §3.5; 𐎶 has the values man_3 and min_5 , and is used for the word *didli*, “several, various”; 𐎶𐎶 has the value eš_6 .



Figure 22: [P222399, obv. 6 16–17]  /  .

between non-numeric $\text{\textcircled{šar}_2}$ written  and numeric $1(\text{\textcircled{šar}_2})$ written  can be observed, similar to the contrast between  and  previously discussed in §3.5. However, in lexical lists from Šuruppag and Ebla⁷⁵, as well as in the *Stèle des vautours*, non-numeric $\text{\textcircled{šar}_2}$ is curviform:

-  and  in [P010566, obv. 10 10, 11];
-  and  in [P010576, rev. 3 16, 17];
-  in [P240986, recto 3 3]⁷⁶;
-  in [P222399, obv. 17 9, 18 11, 22 12]⁷⁷.

It *would* be disruptive to the diachronic representation of text if non-numeric $\text{\textcircled{šar}_2}$ were to have two different representations. The character U+122B9 CUNEIFORM SIGN SHAR2 should therefore be used in those cases, with its curviform glyph , identical to the glyph of the proposed U+12579  CUNEIFORM NUMERIC SIGN ONE N45. Since the archaizing style of texts wherein non-numeric $\text{\textcircled{šar}_2}$ is curviform solidly predates the transition from  to  in the relevant metrological systems, there is no need to represent a - contrast, so these characters can have the same glyph in specialist archaizing Early Dynastic fonts.

Since cuneiform U+122B9 CUNEIFORM SIGN SHAR2 effectively merges with U+1212D  CUNEIFORM SIGN HI, the reference glyph should remain as it is, *i.e.*, curviform, so that the contrast between reference glyphs within the Cuneiform block remains clear; see [UTR56, §2.4]. Since system fonts follow the reference glyphs, and since extant specialist fonts target styles where U+122B9 is unambiguously cuneiform, there are no compatibility issues.

Note that in rare cases, such as [P222243, obv. 2 7] from ED IIIa Adab, non-numeric  (here with the value *rum*) is written . It is out of scope for this proposal to decide whether such occurrences should be treated as anomalous spellings, encoded as U+12550  cuneiform numeric sign one N01, or as stylistic

⁷⁵These are archaizing in other ways, *e.g.*, they have a  (NAM₂-TUG₂) split.

⁷⁶From copy in [Man81, ELLeS 397].

⁷⁷Note however  on [P222399, obv. 6 17], see Figure 22. Curviform non-numeric $\text{\textcircled{šar}_2}$ is clearly archaizing in ED IIIb Nirsu; one might suppose that the scribe slipped into their modern ways here.

example is [Mol14, p. 39], which uses $1a$ for \leftarrow , $1d$ for \uparrow , $1ac$ for \triangleright , $1dc$ or $\frac{1}{2}dc$ for \triangleright depending on reading, etc. The literature on the Uruk and Early Dynastic I–II periods uses a different set of transliteration conventions that also disambiguate numeral shapes, as will be discussed in §4.

While there exist transliterations that distinguish \leftarrow from \uparrow but not \mathbb{B} from \leftarrow , such as the ones used in [DCCMT], the trend, especially in more recent works in third millennium studies, seems to be to represent numeral shape; for example, [MV24] gave an example of the input syntax used by the new “Urban Economy Begins” project as “10 + 5c(GUR) + 2(BARIGA) + 1(BAN2)” for $\bullet\mathbb{B}\mathbb{P}\uparrow\leftarrow$, with a c indicating that the GUR numerals are curviform, and the parenthetical GUR indicating that these are \triangleright rather than \triangleright numerals. The “tradition of cavalierly dispensing with numerical notations in editions of administrative documents”, as [Eng04, p. 30] describes it, seems to be fading.

3.8 Conclusions

Co-occurrences of curviform and cuneiform numerals are not anecdotal in the Early Dynastic period, nor are they the result of scribal idiosyncrasy. Instead, they represent systematic contrasts between metrological systems, between individual units within metrological system, and between numeric usage and phonetic or logographic usage. This contrastive usage is reflected in modern publications. The contrast frequently applies to individual numerals, rather than to the span of entire numeric expressions.

While it would be technically possible to handle this contrast as a stylistic distinction, this approach has no real benefit, and is highly inconvenient, as it would require any treatment of Early Dynastic administrative texts to use multiple cuneiform fonts, often within single numeric expressions. Further, if that contrast is lost in plain-text interchange, the text can be misinterpreted: \lll is a length of three ropes, but $\bullet\bullet$ is an area of three bur₃; $\triangleright\uparrow$ could be read as one $\mathbb{C}\mathbb{L}$ \uparrow and one $\mathbb{V}\uparrow\mathbb{C}\mathbb{L}$, where $\triangleright\triangleright$ would be one and a half $\mathbb{C}\mathbb{L}$ \uparrow ; $\leftarrow\mathbb{C}\mathbb{L}$ is a personal name, but $\triangleright\mathbb{C}\mathbb{L}$ would be “one slave”.

In addition, there would be a risk of confusion about character identity should fontmakers attempt to treat the curviform and cuneiform numerals as unified. A designer concerned about the numeric-syllabic $\triangleright\leftarrow$ contrast, and wishing to support diachronic encoding between systems $S_{Ur III/OB}$ and S , might give the \uparrow numeral series (which is typically only used numerically in the Early Dynastic period) the glyphs of the \triangleright numeral series, since the clear $\uparrow\text{--}\triangleright$ identification involves the same rotation; this would however make it impossible to represent capacity measures that use \triangleright . Similarly, in an effort to support diachronic encoding for $1/2$ (iku), one might be tempted to give \searrow the glyph of \triangleright , thereby rendering the font unusable for quantities measured using the \searrow numeral series; an ED I–II Ur font designer could decide to give \mathbb{K} the same glyph as \mathbb{C} (that of the proposed \bullet), according to the older area system, making it impossible to represent the newer system.

At the same time, contrary to most disunifications, the separate encoding of curviform numerals poses no serious compatibility issues for existing fonts or encoded corpora, nor does it, in general, introduce new issues with transliterated third millennium corpora. The oddity of \bullet requires some explanation, but does not pose any architectural issues, and is not fundamentally different from the other mergers and splits encountered in the cuneiform script.

4 Rationale for ED–Uruk numeral unification

A complete rationale for disunification between the non-numeric signs used in the fourth millennium and the already-encoded cuneiform signs will be given in the forthcoming proto-cuneiform encoding proposal. The core issue with extending the cuneiform script further back in time is that, since 1987, fourth millennium studies have used a different model of character identity and associated transliteration conventions, with names being given to structurally different glyphs, and no attempt being made at assigning phonetic values to them.

This is not a mere classification of glyph variants, as contrastive meanings of these systematic variants can often be reconstructed, with, *e.g.*, signs $KA\check{S}_a$, $KA\check{S}_b$, and $KA\check{S}_c$, depicting filled jars with a spout (a), a handle (c), or neither (b), being understood as referring to containers of different substances, see [Eng01, pp. 34 sq.]. However, not all identified systematic variants are understood, and the general approach to character identity is closer to that used for undeciphered or partially deciphered scripts.

As part of the development of these conventions, a classification of fourth millennium numeric signs was developed; see [DE87]. This classification assigns to each unit numerals an identifier formed by the letter N with a numeric subscript (sometimes with an additional alphabetic subscript): N_1 is \triangleright , N_{14} is \bullet , N_{34} is \triangleright , etc. Transliterations of numeric expression then use those to identify the type of number used, thus $5N_1$ is \mathbb{B}^P , and $5N_{14}$ is $\bullet\bullet\bullet$.

In contrast with the use of parenthetical unit names, this approach does not require interpreting the quantity being counted. This is valuable in contexts where numerals are being used atypically, as conventional transliterations can otherwise force a dubious interpretation. For instance, the [CDLI] transliteration of $\triangleright\triangleright\triangleright\check{E}$ or $\mathbb{B}\check{E}$ in [P283802, rev. 1 6, 2 2] currently uses (barig@c) for the vertical numerals, since \check{E} numerals are typically capacity measures; but [Gor23] interprets these instead as counting linen textiles. As a result, the fourth millennium conventions for numeral transliteration are used in Early Dynastic texts, especially those from the ED I–II period, even though the Sumerian text uses classical Assyriological transliteration conventions; see [Cha03, p. 6 n. 27].

While the non-numeric signs are treated as undeciphered, the metrological systems used in the fourth millennium are well understood, as can be seen in [DE87, p. 165]. As a result, contrary to the non-numeric proto-cuneiform conventions, these numeric transliteration conventions are compatible with the classical ones described in §3.7.2; they are indeed used interchangeably, as in [P011104] which uses the notation $u@f$ in [ePSD2], but $N_{14}@f$ in [CDLI]. Indeed, the numerals are used similarly in Early Dynastic metrological systems, and are visually identical.

A disunification of numerals between the third and fourth millennium would therefore induce confusion as to which numerals should be used in third millennium studies, and would needlessly duplicate the encoding of at least seventy characters; by splitting the attestations, these separate encoding proposals would run into additional difficulties to supply evidence for encoding.

Note that the structural variants designated by letters in fourth millennium notation have systematically been encoded, as they have occasionally be found to carry distinct numeric meaning. For instance, $\mathbb{X} N_{30c}$ is listed as a variant of $\mathbb{X} N_{30a}$ in [DE87, p. 166], where the numeric value of either in relation to $\check{E} N_{39a}$ is still unknown, but their values are found in [Eng04, p. 33] to be $\mathbb{X} = \frac{1}{10} \check{E}$, whereas

$$\text{𒀭} = \frac{1}{6} \text{𒀮}.$$

5 Considerations on individual numeral series

Usages of the characters U+12550–U+12597, under subheadings “Common Numerals”, “Numerals used for land areas”, and “Early Dynastic capacity measures”, have already been discussed in §3.4. The variant forms of fractions of the iku are not unifiable with the ordinary ones: 𒀭 is never used as a capacity measure, nor as one half in any other metrological system, contrary to 𒀮.

The character 𒀮 represents both the usages $\frac{1}{2}$ and 1 ban₂, whereas U+12226 𒀮 CUNEIFORM SIGN MASH and U+1244F 𒀮 CUNEIFORM NUMERIC SIGN ONE BAN₂ are disunified. This disunification is motivated by the unrelated origins of maš (logographic, meaning “goat”), always resembling 𒀮, and 1 ban₂, descended from 𒀮. One could argue that based on their etymologies, U+1244F would make more sense as the sign used for $\frac{1}{2}$, but U+12226 is used as the transliteration MAŠ is frequent, see, e.g., [Hue11, p. 165].

The signs U+12598 𒀮 and U+12599 𒀮 are used in the ED IIIb Nirsu weight system for fractions $\frac{1}{3}$ and $\frac{2}{3}$ of a shekel, with the already-encoded U+1245D 𒀮 and U+1245E 𒀮 used for fractions of a mina, see [Lec16]. Note that as usual, the description 𒀮 × (𒀮 + n 𒀮) must be understood as allowing for free variation between 𒀮, 𒀮, and 𒀮, the last one being the description in [Lec16]. Compare 𒀮 discussed in [UTR56, §2.5], 𒀮 šeššig = 𒀮 × 𒀮 = 𒀮 × 𒀮 (the last one in, e.g., Ebla lexical texts).

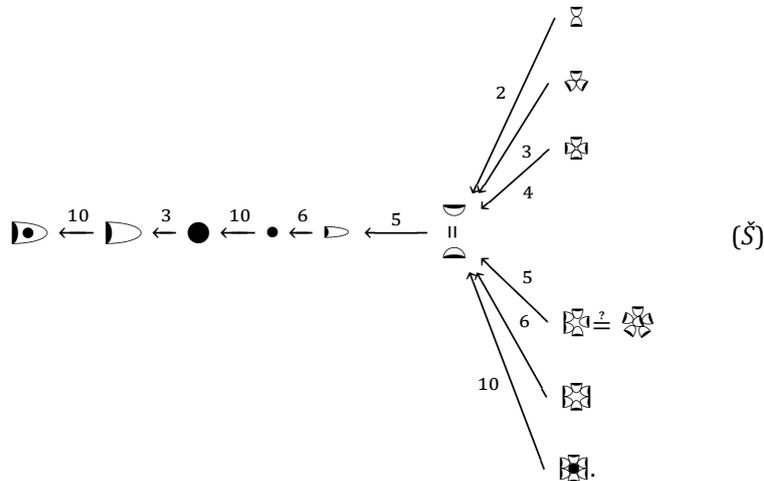
The characters U+12550–U+12597 are used in the bisexagesimal counting system, whose factor diagram is as follows [Fri78, p. 15; DE87, p. 165; NDE93, p. 28], with 𒀮 being the unit:

$$\text{⊙} \xleftarrow{6} \text{𒀮} \xleftarrow{10} \text{𒀮} \xleftarrow{2} \text{𒀮} \xleftarrow{6} \text{•} \xleftarrow{10} \text{𒀮} \xleftarrow{2} \text{𒀮} \quad (B)$$

This system is used to count rations of discrete dry grain products, cheese, and fresh fish; see [DE87, pp. 132–134][28]NissenDamerowEnglund1993[34]Englund2004. It is well attested in the fourth millennium, but is also attested in Early Dynastic IIIa Šuruppak. The reference glyph for ⊙ is based on the design in [DE87; NDE93], rather than the one in [Eng04; Eng23], as the latter requires the use of grey, whereas the earlier one is black and white. The highest attested number in this system is ⊙⊙𒀮𒀮, in [P003595].

The characters U+12597–U+125B0, U+125B6–U+125BD are used in the grain capa-

city system [DE87, pp. 136–139, 165; NDE93, p. 28; Eng01, p. 4; Eng04, pp. 33, 39]:



The signs U+125B1–U+125B5 are listed together with them in [Eng01, p. 29] under “dry cereal products and rations: numerical signs in ideographic use”. Since the numerals up to 5 are encoded based on their use in system *S*, there is no need to find the highest attested quantity measured in system *S*.

The characters U+125BE–U+125D0 are used in a variant of system *S* used to count dead animals, as well as and jars of certain types of beer; see [DE87, p. 131; NDE93, p. 28; Eng04, p. 40 n. 23]:



The highest attested number in this system is , 306 dead sheep, in [P006365]. The sign is also used in a liquid capacity system, see [DE87, p. 131; NDE93, p. 29; Eng04, p. 33].

The characters U+125D1–U+125E9 are used in a variant of the bisexagesimal system used to count a certain kind of rations, possibly a type of fish; see [DE87, pp. 135, 165; NDE93, p. 28]:



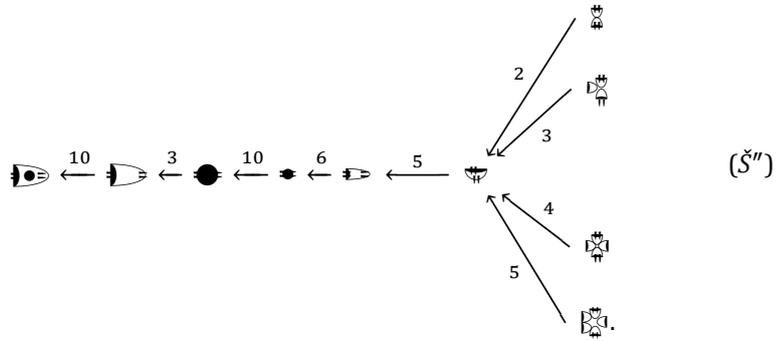
The highest well-preserved number in this system is in [P005153]; there is also a damaged in [P004804].

The characters U+125EA–U+125FD are used in a variant of system *S* probably used to measure malted barley, see [DE87, p. 139; NDE93, p. 29; Eng01, p. 17 n. 30]:

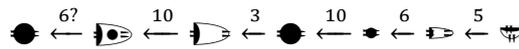


The highest attested quantity in this system is , in [P005363]. The numeral N_{45a} is not included in [DE87, pp. 165 sq.], and the numeral N_{24a} appears there only in brackets, without a name; both appear in [NDE93, p. 29; Eng04, p. 33] with the names $N_{45'}$ and $N_{24'}$, and are listed in [Eng23] with their ATF names $N_{45\sim a}$ and $N_{24\sim a}$. They are attested in [CDLI] transliterations.

The characters U+125FE–U+12622 are used in a variant of system \check{S} probably used to measure emmer, see [DE87, p. 140, p. 155 n. 67; NDE93, p. 29]:

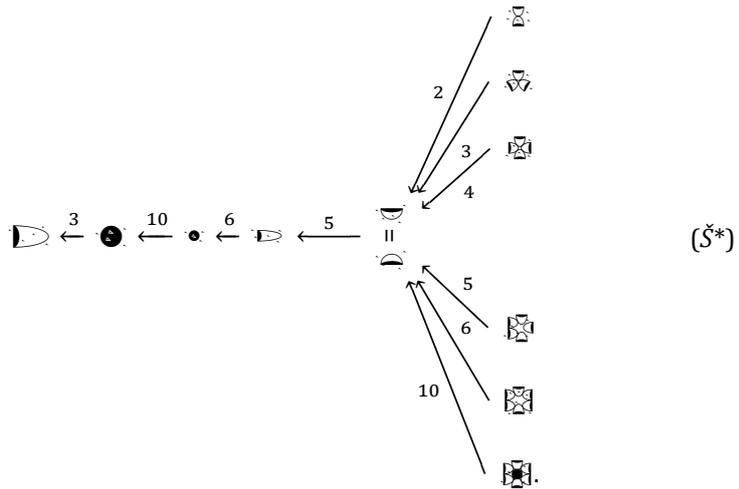


The fractions are not listed in any of [DE87; NDE93; Eng04], but those that are included are attested in [CDLI] and listed in [Eng23]. As noted in [DE87, p. 140] \bullet N_{46} appears to also represent a quantity larger than 𐎶 , with $3 \bullet = 2 \text{𐎶} = 5 \text{𐎶} = 1 \text{𐎶}$ attested in [P003330]. [DE87, p. 140] suggests $\bullet = 6 \text{𐎶}$ based on proto-Elamite $\bullet = 6 \text{𐎶}$, with the factor diagram



reused in later works. Given that this ratio is questionable, and that 5𐎶 is not attested, we have neither included 5𐎶 nor $3 \bullet$. The highest attested clearly understood quantity in this system is $\text{𐎶} \text{𐎶} \text{𐎶} \text{𐎶} \text{𐎶}$ in [P002673].

The characters U+12623–U+12642 are used in a variant of system \check{S} probably used to measure barley groats, see [DE87, p. 141; NDE93, p. 29; Eng01, p. 3 n. 7, p. 17 n. 30].



The fractions 𐎶 , 𐎶 , and 𐎶 are listed in [DE87], the last one in brackets without a name. 𐎶 is called N_{28^*} in [NDE93, p. 29; Eng04, p. 33]. All fractions included here are attested in [CDLI] transliterations and listed in [Eng23]. The highest attested quantity is $\text{𐎶} \text{𐎶} \bullet \text{𐎶} \text{𐎶} \text{𐎶}$ in [P005461].

The characters U+12643–U+1264B are used in a system whose function is unknown, attested only in the Uruk IV period, see [DE87, pp. 143 sq.; NDE93, pp. 27 sq.]:

$$\bullet \xleftarrow{10} \triangleright \xleftarrow{2} \boxtimes \xleftarrow{2} \cup \xleftarrow{4} \text{?} \text{?}, \text{?}, \text{?}. \quad (E)$$

Again as the higher numerals are common, there is no need from a character encoding perspective to search for the highest attested quantity.

The “flat” characters U+1264C–U+12686 are used in various metrological systems in ED I–II Ur, see the factor diagrams in [Cha03, pp. 4 sq.]. These factor diagrams determine most of the upper bounds for the encoded numerals. The highest attested quantity in the “Cereal 2 system” with rectangular signs (similar to system *S*”) is     in [P005773]. The glyphs in [Eng23; L2/23-190] suggest the use of two flat tools, one large and one small, as for the curviform signs. However, the signs all appear to have the same width in photographs; the glyphs in [Cha03] are also consistent with a single flat tool. The glyphs have been adjusted accordingly.

6 Characters not included in this proposal

Some numerals previously proposed in [L2/23-190], as well as some other numerals known to exist in the third millennium, are not included in this proposal. Some should be proposed at a later date; others are likely not encodable.

6.1 Fourth millennium numerals

The following eight numeral series from [DE87, p. 166] are not included; they are all listed as under *Nichteinordenbare Zahlzeichen* in [DE87, p. 147]. On these (and two others, possibly N_{57} and N_{58}), [NDE93, p. 27] write “Ten of the sixty numerical signs contained in the list in figure 27, moreover, do not belong to any of the identified systems. Three of them were apparently scribbled by an awkward pupil. As to four of those remaining, we are not sure whether they constitute derivations of other, as yet unknown numerical signs or whether they are in fact numerical signs at all. For at least two of the ten signs, [N_{23}] and [N_{43}], we can affirm that each formed part of two additional systems, about which we know nothing due to the fact that no informative texts have been unearthed with notations in these systems.”

- N_{13} . [DE87, p. 147] mentions [P002551] as the only attestation. [CDLI] now transliterates this 2(N04), not in [Eng23]. Presumably representable as a rotated , as here.
- N_{16} and N_{17} . Described as “*vermutlich mit ideographischer Funktion*” in [DE87, p. 147]. N_{17} is only attested in [P000524], a witness to [Q000028]. N_{16} is attested in similar context in the same [P000524], but also in other artefacts, including [P283918] and [P283919] where notes by Englund in the [CDLI] transliteration suggest it is numeric, equal to $\frac{1}{20}$ . N_{16} should probably be encoded in the Archaic Cuneiform Numerals block.
- N_{23} . In the current transliterated [CDLI] corpus, attested in one Uruk V artefact, and four Uruk IV artefacts. Similar in shape to proto-Elamite N_{23} , which is well-attested (53 artefacts) and well-understood (part of a decimal system, where it means 100). Best encoded as part of a proto-Elamite proposal, where we would clearly have 1–9, and given appropriate Script_Extensions.

- N_{43} ; according to [DE87, p. 147], probably part of a variant of system \check{S} .
- N_{44} , N_{53} , and N_{55} : Only attested in [P003855], which contains no other text. Presumably these are the “awkward pupil” signs.

In addition, the following are not included:

- N_{10} . Only attested in [P001319] according to [DE87, p. 143], but that text now has N_{11} in its [CDLI] transliteration. Not in [Eng23].
- N_{57} and N_{58} . Dependent on the main proto-cuneiform proposal, whose rationale will justify the disunification from 𐎶 and 𐎶 . These should be encoded in a different block to avoid confusion with 𐎶 and 𐎶 , since the Archaic Numerals block contains numerals unifiable between P_{cun} and X_{sux}.
- N_{59} . Possibly a variant of 𐎶 according to [DE87, p. 147].
- N_{30b} . Not attested in [CDLI] transliterations, not included in Englund’s more recent works such as [Eng01, p. 29], nor in [Eng23].

The well-understood U_4 numerals, documented in [Eng88, pp. 136 sqq.] and listed in [Eng23; L2/23-190], have not been included as they are likewise dependent on the disunification of proto-cuneiform, and should be encoded in a different block to avoid confusion with 𐎶 . Some additional numeral series from [Eng23; L2/23-190] are not included due to lack of documentation on their usage. In general, only numerals that are part of a well-understood metrological system have been included. In particular, numerals such as $12\bullet$ (attested in [P200010]) have not been encoded, since the metrological systems involving \bullet numerals should not allow for a numeral beyond $\bullet\bullet\bullet\bullet$ ($9\bullet$).

In addition, numerals that are not attested have not been included, unless they are part of a series where higher numerals in the metrological system are attested; thus the unattested 𐎶𐎶𐎶 and 𐎶𐎶 , which are not in [Eng23], are included, because 𐎶𐎶𐎶 is attested in [P006365], in a context where it is clearly used as part of system S' . However, $1(N30C\sim b)$, which is in [Eng23], and is the obvious counterpart of 𐎶 in system \check{S}'' , therefore presumably equal to $\frac{1}{10}\text{𐎶}$, is not included, as it is not attested in [CDLI] transliterations at this time.

6.2 Third millennium numerals

The sign N_{48}^f listed in [Eng23; L2/23-190] only has questionable attestations in [CDLI] transliterations, and is not mentioned in [Chao3]. It has not been included.

The metrological systems from Early Dynastic IIIb Nirsu discussed in §3.4 require the numerals $7\setminus$, $8\setminus$, and $9\setminus$, whereas only \setminus - 𐎶 are encoded. \setminus numerals are also used in dates. The higher numerals are less frequent, as subtractive notation is often used instead, e.g., 𐎶𐎶 rather than $9\setminus$, or 𐎶𐎶𐎶 rather than $\text{𐎶𐎶}8\setminus$, which is presumably why they are not yet encoded. However, they are clearly attested and understood enough to be encodable. They should be encoded in the Cuneiform Numbers and Punctuation block.

Early Dynastic IIIb Nirsu regnal years use $\text{𐎶}\times\setminus$ numerals (1–9). these are extremely well attested: a [CDLI] search for "(|ASZxDISZ@t |)" finds 1482 artefacts, all ED IIIb, of which 1447 are from Nirsu. These could be encoded in the Cuneiform Numbers and Punctuation block; together with $7\text{--}9\setminus$, this would fill the block.

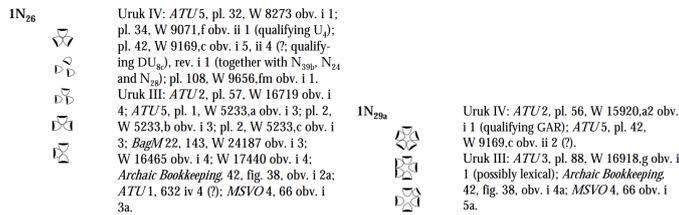


Figure 26: Variants of  and  from [Eng01, p. 31].

that the vertical stacking patterns are impractical.

Variant stacking patterns, if needed, may be handled at a higher level as stylistic distinctions; Figure 25 uses OpenType stylistic alternates, and Figure 23 rotates the character , in both cases preserving the plain text backing.

6.4 Other glyph variants not reflected in transliteration

In addition to stacking patterns proper, [L2/23-190, pp. 128 sq.] proposes separately encoding variant glyphs that are not distinguished in transliteration, but are listed (under the same name) in [Eng23], thus proposing two characters for  and two characters for . These are merely illustrative of a wide continuum of attested glyphs; there are additional variants, as shown in Figure 26, and a cursory search on [CDLI] will find many attestations with further variation in the same vein. They should not be encoded. Only the systematic structural variants, which have been distinguished in transliteration based on a suspicion of distinct semantics, should be encoded.

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Peter Constable and Karljürgen Feuerherm provided useful feedback on the wording. Ned Holbrook reviewed the property assignments. Robin Leroy authored the bulk of the text. Rick McGowan suggested including a note in the character names list to clarify the identity of shrunk numerals in the code charts. Erica Scarpa brought the need for encoding the curviform numerals to our attention on multiple occasions and suggested several crucial references, most importantly [Gor23] which clearly demonstrates contrastive textual usage of curviform and cuneiform numerals in modern publications. Steve Tinney provided essential assistance on the interpretation of the Sumerian texts and suggested useful references. Ken Whistler gave important advice on matters of encodability, roadmapping, code point choice, and names list editing.

The reference glyphs for most of the proposed characters whose `Script_Extensions` value contains `Pcun` are based on a font made by Anshuman Pandey for [L2/23-190], itself based on designs by Bob Englund in [Eng23]. The reference glyphs for , , and  are based on designs by Steve Tinney. The glyphs were adjusted by Robin Leroy as described in §5 and §6.3.

The Old Babylonian and Neo-Assyrian fonts used in §3.1 and in the epigraphs in §3.3 and §3.5 are *Santakku* and *Assurbanipal*, fonts created by Sylvie Vanséveren, available on the Hethitologie Portal Mainz [Van21]. The *CuneiformComposite* font

by Steve Tinney is used when referring to the reference glyphs for already-encoded cuneiform. *Noto Sans Cuneiform*, by Monotype Imaging, is used to for most of the cuneiform text in this document, with modifications (cuneiform glyph for \diamond ŠAR₂, corrected glyphs for 𒌦 UN and 𒌧 KALAM per [Uni6], alternate glyph 𒌦 for 𒌦). Arabic text is set in *Scheherazade New* by SIL International; Traditional Chinese text is set in *Noto Serif TC* by Ken Lunde et al.; 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

- [P000524] IM 134791. Baghdad, Iraq: المتحف العراقي.
CDLI: [P000524](#).
ORACC: [dcclt/P000524](#).
- [P001243] VAT 14991. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P001243](#).
- [P001319] VAT 14803. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P001319](#).
- [P002551] VAT 16720. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P002551](#).
- [P002673] Excavation W 17729,au.
CDLI: [P002673](#).
- [P003330] HD: W 19726,a. Berlin, Germany: Deutsches Archäologisches Institut.
CDLI: [P003330](#).
- [P003499] Excavation number W 20274,001.
CDLI: [P003499](#).
- [P003595] HD: W 20274,97. Berlin, Germany: Deutsches Archäologisches Institut.
CDLI: [P003595](#).
- [P003855] HD: W 20522,2. Berlin, Germany: Deutsches Archäologisches Institut.
CDLI: [P003855](#).
- [P004430] IM 074345. Baghdad, Iraq: المتحف العراقي.
CDLI: [P004430](#).
- [P004500] IM 134965. Baghdad, Iraq: المتحف العراقي.
CDLI: [P004500](#).
- [P004804] IM 135570. Baghdad, Iraq: المتحف العراقي.
CDLI: [P004804](#).
- [P005153] Ashm 1926-0642. Oxford, United Kingdom: Ashmolean Museum.
CDLI: [P005153](#).
- [P005363] Berlin 004. Berlin, Germany.
CDLI: [P005363](#).

- [P005461] NBC 05829. New Haven, Connecticut, United States: Nies Babylonian Collection, Yale Babylonian Collection.
CDLI: [P005461](#).
- [P005468] IM 023426. Baghdad, Iraq: المتحف العراقي.
CDLI: [P005468](#).
- [P005773] BM 128895. London, United Kingdom: British Museum.
CDLI: [P005773](#).
- [P006365] Anonymous.
CDLI: [P006365](#).
- [P010424] IM 067642. Baghdad, Iraq: المتحف العراقي.
CDLI: [P010424](#).
ORACC: [epsd2/P010424](#).
- [P010458] IM 081445. Baghdad, Iraq: المتحف العراقي.
CDLI: [P010458](#).
ORACC: [epsd2/P010458](#).
- [P010459] IM 081449. Baghdad, Iraq: المتحف العراقي.
CDLI: [P010459](#).
ORACC: [epsd2/P010459](#).
- [P010566] VAT 12760 +. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P010566](#).
ORACC: [epsd2/P010566](#).
ORACC: [dcclt/P010566](#).
- [P010570] VAT 12626. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P010570](#).
ORACC: [epsd2/P010570](#).
ORACC: [dcclt/P010570](#).
- [P010572] VAT 12644. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P010572](#).
ORACC: [epsd2/P010572](#).
ORACC: [dcclt/P010572](#).
- [P010576] VAT 12751 +. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P010576](#).
ORACC: [dcclt/P010576](#).
- [P010578] VAT 12693. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P010578](#).
ORACC: [dcclt/P010578](#).
- [P010586] VAT 12770. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P010586](#).
ORACC: [dcclt/P010586](#).
- [P010678] VAT 12593. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P010678](#).
ORACC: [dccmt/P010678](#).
- [P010773] Ist Š 0188. Istanbul, Turkey: İstanbul Arkeoloji Müzeleri.
CDLI: [P010773](#).
ORACC: [dccmt/P010773](#).

- [P010876] Ist Š 0648. Istanbul, Turkey: İstanbul Arkeoloji Müzeleri.
CDLI: [P010876](#).
ORACC: [epsd2/P010876](#).
- [P010960] VAT 12745. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P010960](#).
ORACC: [epsd2/P010960](#).
- [P011099] VAT 12438. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P011099](#).
ORACC: [epsd2/P011099](#).
- [P011104] VAT 12624. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P011104](#).
ORACC: [epsd2/P011104](#).
- [P020006] VAT 04439. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020006](#).
ORACC: [epsd2/P020006](#).
- [P020008] VAT 04430. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020008](#).
ORACC: [epsd2/P020008](#).
- [P020016] VAT 04865. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020016](#).
ORACC: [epsd2/P020016](#).
- [P020018] VAT 04800. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020018](#).
ORACC: [epsd2/P020018](#).
- [P020019] VAT 04793. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020019](#).
ORACC: [epsd2/P020019](#).
- [P020024] VAT 04795. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020024](#).
ORACC: [epsd2/P020024](#).
- [P020030] VAT 04633. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020030](#).
ORACC: [epsd2/P020030](#).
- [P020054] VAT 04731. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020054](#).
ORACC: [epsd2/P020054](#).
- [P020057] VAT 04747. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020057](#).
ORACC: [epsd2/P020057](#).
- [P020065] VAT 04639. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020065](#).
ORACC: [epsd2/P020065](#).
- [P020066] VAT 04810. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020066](#).
ORACC: [epsd2/P020066](#).

- [P020090] VAT 04609. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020090](#).
ORACC: [epsd2/P020090](#).
- [P020092] VAT 04428. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020092](#).
ORACC: [epsd2/P020092](#).
- [P020129] VAT 04713. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020129](#).
ORACC: [epsd2/P020129](#).
- [P020137] VAT 04899. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020137](#).
ORACC: [epsd2/P020137](#).
- [P020182] VAT 04405. Berlin, Germany: Vorderasiatisches Museum.
CDLI: [P020182](#).
ORACC: [epsd2/P020182](#).
- [P102305] X.3.139. Atlanta, Georgia, United States: Michael C. Carlos Museum, Emory University.
CDLI: [P102305](#).
ORACC: [epsd2/P102305](#).
- [P142357] YBC 01793. New Haven, Connecticut, United States: Yale Babylonian Collection.
CDLI: [P142357](#).
ORACC: [epsd2/P142357](#).
- [P142827] Ashm 1924-0667. Oxford, United Kingdom: Ashmolean Museum.
CDLI: [P142827](#).
ORACC: [epsd2/P142827](#).
- [P200010] MS 4648. Oslo, Norway: Schøyen Collection.
CDLI: [P200010](#).
- [P212464] WML unn 003. Liverpool, United Kingdom: World Museum.
CDLI: [P212464](#).
- [P213162] PULiège 0028. Université de Liège.
CDLI: [P213162](#).
ORACC: [epsd2/P213162](#).
ORACC: [dccmt/P213162](#).
- [P215653] AS 15375 21. Paris, France: Musée du Louvre.
CDLI: [P215653](#).
ORACC: [dcclt/P215653](#).
Louvre Collections: [ark:/53355/cl010436723](#).
- [P220927] AO 13485. Paris, France: Musée du Louvre.
CDLI: [P220927](#).
ORACC: [epsd2/P220927](#).
- [P221266] AO 13825. Paris, France: Musée du Louvre.
CDLI: [P221266](#).
ORACC: [epsd2/P221266](#).
Louvre Collections: [ark:/53355/cl010138527](#).

- [P221291] AO 13850. Paris, France: Musée du Louvre.
CDLI: [P221291](#).
ORACC: [epsd2/P221291](#).
- [P221305] AO 13864. Paris, France: Musée du Louvre.
CDLI: [P221305](#).
ORACC: [epsd2/P221305](#).
- [P221530] YBC 08446. New Haven, Connecticut, United States: Yale Babylonian Collection.
CDLI: [P221530](#).
ORACC: [epsd2/P221530](#).
- [P221531] YBC 08444. New Haven, Connecticut, United States: Yale Babylonian Collection.
CDLI: [P221531](#).
ORACC: [epsd2/P221531](#).
- [P221746] Erm 14039. Saint Petersburg, Russia: Государственный Эрмитаж.
CDLI: [P221746](#).
ORACC: [epsd2/P221746](#).
- [P221814] Erm 14045. Saint Petersburg, Russia: Государственный Эрмитаж.
CDLI: [P221814](#).
ORACC: [epsd2/P221814](#).
- [P221815] Erm 14046. Saint Petersburg, Russia: Государственный Эрмитаж.
CDLI: [P221815](#).
ORACC: [epsd2/P221815](#).
- [P222186] FLP 0003. Philadelphia, Pennsylvania, United States: Free Library of Philadelphia.
CDLI: [P222186](#).
ORACC: [epsd2/P222186](#).
- [P222243] OIM A00645 + OIM A00649a-i. Chicago, Illinois, United States: Institute for the Study of Ancient Cultures, West Asia & North Africa (formerly Oriental Institute) Museum.
CDLI: [P222243](#).
ORACC: [epsd2/P222243](#).
- [P222399] *Stèle des vautours*. BM 023580 (= AO 16109) + AO 00050 + AO 02436 + AO 02437 + AO 02438. Paris, France: Musée du Louvre.
CDLI: [P222399](#).
ORACC: [etcstri/Q001056](#).
- [P232278] *Gudea E*. AO 00006. Paris, France: Musée du Louvre.
CDLI: [P232278](#).
ORACC: [etcstri/Q001544](#).
- [P232280] *Gudea G*. AO 00007. Paris, France: Musée du Louvre.
CDLI: [P232280](#).
ORACC: [etcstri/Q001546](#).
- [P235312] USC 6710. Los Angeles, California, United States: University of Southern California.
CDLI: [P235312](#).
ORACC: [epsd2/P235312](#).

-
- [P240531] Excavation number TM.75.G.00265.
CDLI: P240531.
EbDA: 1415.
- [P240532] Excavation number TM.75.G.00266.
CDLI: P240532.
EbDA: 1324.
- [P240533] Excavation number TM.75.G.00267.
CDLI: P240533.
EbDA: 1379.
- [P240545] Excavation number TM.75.G.00299.
CDLI: P240545.
- [P240548] Excavation number TM.75.G.00302.
CDLI: P240548.
EbDA: 1350.
- [P240579] Excavation number TM.75.G.00341.
CDLI: P240579.
EbDA: 1364.
- [P240597] Excavation number TM.75.G.00407.
CDLI: P240597.
- [P240609] Excavation number TM.75.G.00440.
CDLI: P240609.
EbDA: 1378.
- [P240653] Excavation number TM.75.G.00535.
CDLI: P240653.
EbDA: 1382.
- [P240654] Excavation number TM.75.G.00536.
CDLI: P240654.
EbDA: 1383.
- [P240655] Excavation number TM.75.G.00537.
CDLI: P240655.
EbDA: 1358.
- [P240675] Excavation number TM.75.G.00557.
CDLI: P240675.
EbDA: 1371.
- [P240697] Excavation number TM.75.G.00579.
CDLI: P240697.
EbDA: 1381.
- [P240964] Excavation number TM.75.G.01392.
CDLI: P240964.
ORACC: dccmt/P240964.
EbDA: 3184.
- [P240986] Excavation number TM.75.G.01415.
CDLI: P240986.
ORACC: dcclt/P240986.

- [P241708] Excavation number TM.75.G.02143.
CDLI: [P241708](#).
EbDA: [3173](#).
- [P241764] Excavation number TM.75.G.02200.
CDLI: [P241764](#).
- [P241904] Excavation number TM.75.G.02346.
CDLI: [P241904](#).
EbDA: [3183](#).
ORACC: [dccmt/P241904](#).
- [P242293] Excavation number TM.75.G.03125.
CDLI: [P242293](#).
EbDA: [217](#).
- [P249253] *Code de Hammurabi*. Sb 00008. Paris, France: Musée du Louvre.
CDLI: [P249253](#).
- [P251641] MS 2464. Oslo, Norway: Schøyen Collection.
CDLI: [P251641](#).
ORACC: [epsd2/P251641](#).
- [P252866] MS 3830. Oslo, Norway: Schøyen Collection.
CDLI: [P252866](#).
ORACC: [epsd2/P252866](#).
- [P255010] YBC 04698. New Haven, Connecticut, United States: Yale Babylonian Collection.
CDLI: [P255010](#).
- [P271238] Anonymous.
CDLI: [P271238](#).
ORACC: [epsd2/P271238](#).
- [P274845] CUNES 50-08-001. Ithaca, New York, United States: Department of Near Eastern Studies, Cornell University.
CDLI: [P274845](#).
- [P283802] Ist Š 0742. Arkeoloji Müzeleri.
CDLI: [P283802](#).
ORACC: [epsd2/P283802](#).
- [P283918] CUNES 50-06-203. Ithaca, New York, United States: Department of Near Eastern Studies, Cornell University.
CDLI: [P283918](#).
- [P283919] CUNES 50-06-217. Ithaca, New York, United States: Department of Near Eastern Studies, Cornell University.
CDLI: [P283919](#).
- [P292843] NBC 05385. New Haven, Connecticut, United States: Nies Babylonian Collection, Yale Babylonian Collection.
CDLI: [P292843](#).
- [P298637] NBC 06978. New Haven, Connecticut, United States: Nies Babylonian Collection, Yale Babylonian Collection.
CDLI: [P298637](#).
ORACC: [epsd2/P298637](#).

- [P305639] YBC 04398. New Haven, Connecticut, United States: Yale Babylonian Collection.
CDLI: [P305639](#).
- [P307255] YBC 06219. New Haven, Connecticut, United States: Yale Babylonian Collection.
CDLI: [P307255](#).
- [P309594] YBC 08761. New Haven, Connecticut, United States: Yale Babylonian Collection.
CDLI: [P309594](#).
ORACC: [epsd2/P309594](#).
- [P386847] AO 06377. Paris, France: Musée du Louvre.
CDLI: [P386847](#).
- [Q000028] *Archaic Food*. Composite text.
CDLI: [Q000028](#).
ORACC: [dcclt/Q000028](#).
- [Q000782] *The instructions of Šuruppag*. Composite text.
CDLI: [Q000782](#).
ORACC: [epsd2/Q000782](#).
ETCSL transliteration: [c.5.6.1](#); translation: [t.5.6.1](#).

ISO and Unicode documents

- [ISO15924] ISO 15924/RA. "ISO 15924 Code Lists". In: *Codes for the representation of names of scripts – Codes pour la représentation des noms d'écritures*. ISO 15924.
<https://www.unicode.org/iso15924/codelists.html>.
- [L2/03-162] M. Everson and K. Feuerherm. *Basic principles for the encoding of Sumerian-Akkadian Cuneiform*. 25th May 2003.
UTC: [L2/03-162](#).
ISO/IEC JTC 1/SC 2/WG 2: [N2585](#).
- [L2/03-393R] M. Everson, K. Feuerherm and S. Tinney. *Preliminary proposal to encode the Cuneiform script in the SMP of the UCS*. 3rd Nov. 2003.
UTC: [L2/03-393R](#).
ISO/IEC JTC 1/SC 2/WG 2: [N2664R](#).
- [L2/04-036] M. Everson, K. Feuerherm and S. Tinney. *Revised proposal to encode the Cuneiform script in the SMP of the UCS*. 29th Jan. 2004.
UTC: [L2/04-036](#).
ISO/IEC JTC 1/SC 2/WG 2: [N2698](#).
- [L2/04-099] L. Anderson. *Unification of Cuneiform Numbers*. 2004.
UTC: [L2/04-099](#).
- [L2/04-189] M. Everson, K. Feuerherm and S. Tinney. *Final proposal to encode the Cuneiform script in the SMP of the UCS*. 8th June 2004.
UTC: [L2/04-189](#).
ISO/IEC JTC 1/SC 2/WG 2: [N2786](#).

- [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](#).
- [L2/23-190] A. Pandey. *Revised proposal to encode Proto-Cuneiform in Unicode*. 11th July 2023.
UTC: [L2/23-190](#).
- [L2/23-196] A. Pandey. *Proposal to encode Proto-Elamite in Unicode*. 18th Aug. 2023.
UTC: [L2/23-196](#).
- [L2/24-159] P. Constable, ed. *Minutes of UTC Meeting 180* (Redmond, 23rd–25th July 2024). 29th July 2024.
UTC: [L2/24-159](#).
- [UAX50] K. Lunde and K. Ishii, eds. *Unicode Vertical Text Layout*. Unicode Standard Annex #50. An integral part of *The Unicode Standard*. The Unicode Consortium.
<https://www.unicode.org/reports/tr50/>.
- [Uni16] The Unicode Consortium. *The Unicode Standard*. Version 16.0.0. The Unicode Consortium, 10th Sept. 2024.
ISBN: 978-1-936213-34-4.
<https://www.unicode.org/versions/Unicode16.0.0/core-spec/>.
- [UTR56] R. Leroy, ed. *Unicode Cuneiform Sign Lists*. Unicode Technical Report #56. The Unicode Consortium.
<https://www.unicode.org/reports/tr56/>.

Online corpora and related projects

- [BLMS] S. Tinney, M. Geller, J. Peterson and L. Vacín, eds. *Bilinguals in Late Mesopotamian Scholarship*. 2014–.
ORACC: [blms](#).
- [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](#).
- [DCCMT] E. Robson, ed. *The Digital Corpus of Cuneiform Mathematical Texts*. 2007–.
ORACC: [dccmt](#).
- [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/>.
- [eBL] E. Jiménez, Z. Földi, A. Häntinen, A. Heinrich, T. Mitto, G. Rozzi, I. Khait, J. Laasonen, F. Simonjetz et al., eds. *electronic Babylonian Library*. 2023–.
<https://www.ebl.lmu.de/>.

- [ePSD2] S. Tinney, P. Jones and N. Veldhuis, eds. *The electronic Pennsylvania Sumerian Dictionary*. 2nd ed. 2017–.
<http://oracc.org/epsd2>.
- [ETCSL] J. A. Black, G. Cunningham, J. Ebeling, E. Flückiger-Hawker, E. Robson, J. Taylor and G. Zólyomi, eds. *The Electronic Text Corpus of Sumerian Literature*. Oxford, 1998–2006.
<http://etcsl.orinst.ox.ac.uk/>.
- [OSL] N. Veldhuis, S. Tinney et al., eds. *Oracc Sign List*. 2014–.
<http://oracc.org/osl/>.

Other documents

- [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).
- [Arc89] A. Archi. “Tables de comptes eblaïtes”. In: *Revue d’assyriologie et d’archéologie orientale* 83.1 (1989). Ed. by P. Amiet and P. Garelli, pp. 1–6. ISSN: 0373-6032.
- [Bor10] R. Borger. *Mesopotamisches Zeichenlexikon*. Alter Orient und Altes Testament 305. Ugarit-Verlag, 2010.
- [Cap02] R. Caplice. *Introduction to Akkadian*. 4th ed. Editrice Pontificio Istituto Biblico, 2002.
ISBN: 88-7653-566-7.
- [Cat13] A. Catagnoti. *La paleografia dei testi dell’amministrazione e della cancelleria di Ebla*. Quaderni di Semitistica 9. Università di Firenze, 2013.
ISBN: 8890134054.
- [Cha03] G. Chambon. “Archaic Metrological Systems from Ur”. In: *Cuneiform Digital Library Journal* 2003.5 (23rd Dec. 2003). ISSN: 1540-8779.
http://cdli.ucla.edu/pubs/cdlj/2003/cdlj2003_005.html.
- [Cha12] G. Chambon. “Numeracy and Metrology”. In: *The Oxford Handbook of Cuneiform Culture*. Ed. by K. Radner and E. Robson. Oxford University Press, 18th Sept. 2012, pp. 51–67.
ISBN: 9780199557301.
DOI: [10.1093/oxfordhb/9780199557301.013.0003](https://doi.org/10.1093/oxfordhb/9780199557301.013.0003).
- [Civ85] M. Civil. “Sur les “livres d’écoliers” à l’époque paléo-babylonienne”. In: *Miscellanea babilonica. Mélanges offerts à Maurice Birot*. Ed. by J.-R. Kupper and J.-M. Durand. Paris: Éditions Recherche sur les Civilisations, 1985, pp. 67–78.
- [DE87] P. Damerow and R. K. Englund. “Die Zahlzeichensysteme der archaischen Texte aus Uruk”. In: M. W. Green and H. J. Nissen. *Zeichenliste der archaischen Texte aus Uruk*. Archaische Texte aus Uruk 2. Gebr. Mann Verlag, 1987. Chap. 3, pp. 117–165. Repr.
<https://cdli.mpiwg-berlin.mpg.de/files-up/publications/englund1987a.pdf>.

- [Dei22] A. Deimel. *Liste der archaischen Keilschriftzeichen von Fara*. Wissenschaftliche Veröffentlichungen der Deutschen Orient-Gesellschaft 40. J. C. Hinrichs'sche Buchhandlung, 1922.
- [Eng01] R. K. Englund. "Grain Accounting Practices in Archaic Mesopotamia". In: *Changing Views on Ancient Near Eastern Mathematics*. Ed. by J. Høyrup and P. Damerow. Berliner Beiträge zum Vorderen Orient 19. Dietrich Reimer Verlag, 2001, pp. 1–35.
- [Eng04] R. K. Englund. "Proto-Cuneiform Account-Books and Journals". In: *Creating Economic Order. Record-keeping, Standardization and the Development of Accounting in the Ancient Near East*. Ed. by M. Hudson and C. Wunsch. International Scholars Conference of Ancient Near Eastern Economies 4. CDL Press, 2004. Chap. 1, pp. 23–46.
- [Eng23] R. K. Englund. *Proto-cuneiform sign list*. 2023. https://cdli-gh.github.io/proto-cuneiform_signs/.
- [Eng88] R. K. Englund. "Administrative Timekeeping in Ancient Mesopotamia". In: *Journal of the Economic and Social History of the Orient* 31.2 (1988).
- [Eng98] R. K. Englund. "Texts from the Late Uruk Period". In: *Mesopotamien. Späturuk-Zeit und Frühdynastische Zeit*. Orbis Biblicus et Orientalis 160/1. 1998, pp. 13–233. ISBN: 3-7278-1166-8.
- [Feu04] K. G. Feuerherm. "Abum-waqar and His Circle. A Prosopographical Study". PhD thesis. University of Toronto, 2004.
- [Fox16] D. A. Foxvog. "Introduction to Sumerian Grammar". In: *Cuneiform Digital Library Preprints* 2016.2 (4th Jan. 2016). <https://cdli.mpiwg-berlin.mpg.de/articles/cdli/2.0>.
- [Fox22] D. A. Foxvog. "Elementary Sumerian Glossary (revised 2022)". In: *Cuneiform Digital Library Preprints* 2022.3.1 (11th Apr. 2022). <https://cdli.mpiwg-berlin.mpg.de/articles/cdli/3.1>.
- [Fri07] J. Friberg. *A Remarkable Collection of Babylonian Mathematical Texts*. Sources and Studies in the History of Mathematics and Physical Sciences. Springer, 2007. Manuscripts in the Schøyen Collection Cuneiform Texts 1. Manuscripts in the Schøyen Collection 6. ISBN: 978-0-387-34543-7.
- [Fri78] J. Friberg. *A Method for the Decipherment, through Mathematical and Metrological Analysis, of Proto-Sumerian and Proto-Elamite Semi-Pictographic Inscriptions*. The Third Millenium Roots of Babylonian Mathematics 1. Department of Mathematics, Chalmers University of Technology, 1978.
- [Fri79] J. Friberg. *The Early Roots of Babylonian Mathematics*. 2. Department of Mathematics, Chalmers University of Technology, 1979.
- [Fri86] J. Friberg. "Three Remarkable Texts from Ancient Ebla". In: *Vicino Oriente* 6 (1986), pp. 3–25. ISSN: 0393-0300. The Early Roots of Babylonian Mathematics 3.

- [Fri87] J. Friberg. "Mathematik". In: *Reallexikon der Assyriologie und vorderasiatischen Archäologie*. Ed. by D. O. Edzard. Vol. 7 Libanukšabaš-Medizin. 1987–1990, pp. 531–585.
- [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.
- [Hue11] J. Huehnergard. *A Grammar of Akkadian*. 3rd ed. Brill, 2011. ISBN: 978-1-57506-941-8.
- [JJ24] T. Jauhiainen and H. Jauhiainen. "Advancing Cuneiform Text Dating Through Automatic Analysis". 69th Rencontre Assyriologique Internationale (8th–12th July 2024). 11th July 2024 14:00.
- [Kre98] M. Krebernig. "Die Texte aus Fāra und Tell Abū Šalābiḥ". In: *Mesopotamien. Späturuk-Zeit und Frühdynastische Zeit*. Orbis Biblicus et Orientalis 160/1. 1998, pp. 235–427. ISBN: 3-7278-1166-8.
- [Lan50] B. Landsberger. "Assyriologische Notizen". In: *Die Welt des Orients* 1.5 (1950).
- [Lec12] C. Lecompte. "Des chiffres et des digues: à propos de deux textes présargoniques de Ĝirsu et d'une notation numérique inhabituelle". In: *Altorientalische Forschungen* 39.1 (Dec. 2012), pp. 81–86. DOI: 10.1524/aof.2012.0006.
- [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.
- [Man81] P. Mander. "Lista dei segni dei testi lessicali di Ebla". In: *Testi lessicali monolingui della biblioteca L. 2769*. Ed. by G. Pettinato. Materiali epigrafici di Ebla 3. Napoli: Istituto universitario orientale, 1981, pp. 285–382.
- [Mol14] M. Molina. *Sargonic Cuneiform Tablets in the Real Academia de la Historia. The Carl L. Lippmann Collection*. Real Academia de la Historia, 2014. ISBN: 978-84-15069-71-3.

- [MV24] M. Maiocchi and S. Volpi. “Reassessing Economic History in the Early Dynastic Period. Sources, Methods, and Perspectives within the frame of the “Urban Economy Begins” Project”. 69th Rencontre Assyriologique Internationale (8th–12th July 2024). 12th July 2024 16:00.
- [NDE93] H. J. Nissen, P. Damerow and R. K. Englund. *Archaic Bookkeeping. Early Writing and Techniques of Economic Administration in the Ancient Near East*. Trans. by P. Larsen. The University of Chicago Press, 1993.
ISBN: 0-226-58659-6.
- [Oel22] J. Oelsner. *Der Kodex Ḫammu-rāpi*. dubsar 4. Zaphon, 2022.
ISBN: 978-3-96327-008-6.
- [Pos] J. N. Postgate. *City of Culture 2600 BC. Early Mesopotamian History and Archaeology at Abu Salabikh*. Archaeopress.
ISBN: 9781803276694.
DOI: [10.32028/9781803276694](https://doi.org/10.32028/9781803276694).
- [Pow71] M. Powell. “Sumerian Numeration and Metrology”. PhD thesis. University of Minnesota, 1971.
- [Pow72] M. Powell. “Sumerian Area Measures and the Alleged Decimal Substratum”. In: *Zeitschrift für Assyriologie und Vorderasiatische Archäologie* 62.2 (1972), pp. 165–221. ISSN: 0084-5299.
- [Pow75] M. Powell. In: *Journal of Cuneiform Studies* 27.3 (July 1975), pp. 180–188. Rev. of H. Limet. *Étude de documents de la période d’Agadé appartenant à l’Université de Liège*. Bibliothèque de la Faculté de Philosophie et Lettres de l’Université de Liège 206. Paris: Les Belles Lettres, 1973.
- [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.
- [Pro09] C. Proust. “Numerical and Metrological Graphemes: From Cuneiform to Transliteration”. In: *Cuneiform Digital Library Journal* 2009.1 (22nd June 2009). ISSN: 1540-8779.
http://cdli.ucla.edu/pubs/cdlj/2009/cdlj2009_001.html.
- [Pro20] C. Proust. “Early-Dynastic Tables from Southern Mesopotamia, or the Multiple Facets of the Quantification of Surfaces”. 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. 9, pp. 345–395.
- [Rob08] E. Robson. *Mathematics in Ancient Iraq. A Social History*. Princeton University Press, 2008.
ISBN: 978-0-691-09182-2.
- [Rob19] E. Robson. “Oracc metrology guidelines”. In: *Oracc: The Open Richly Annotated Cuneiform Corpus*. 18th Dec. 2019.
ORACC: [doc/help/editinginf/metrology/metrologicaltables](https://oracc.museum-institut-assyriologique.fr/doc/help/editinginf/metrology/metrologicaltables).
- [Rob22] E. Robson. “Overview of Metrological Systems”. In: *The Digital Corpus of Cuneiform Mathematical Texts*. 2022.
ORACC: [dccmt/Metrology](https://oracc.museum-institut-assyriologique.fr/doc/help/editinginf/metrology/metrologicaltables).

- [Rom23] A. Romach. *Stylometric Analysis for Akkadian Cuneiform Texts*. 2023-.
<https://github.com/ARomach/Cuneiform-Stylometry>.
- [Rom24] A. Romach. “The Neo Assyrian Land Sale Documents from Dur-Katlimmu. A Stylometric Analysis of Their Scribal Features”. 69th Rencontre Assyriologique Internationale (Helsinki, 8th–12th July 2024). 10th July 2024 12:00.
- [Sch10] W. Schramm. *Akkadische Logogramme*. Göttinger Beiträge zum Alten Orient 5. Universitätsverlag Göttingen, 2010.
ISBN: 978-3-941875-65-4.
DOI: [10.17875/gup2010-511](https://doi.org/10.17875/gup2010-511).
- [Sch35] N. Schneider. *Die Keilschriftzeichen der Wirtschaftsurkunden von Ur III*. Editrice Pontificio Istituto Biblico, 1935.
- [Svä+24] S. Svärd, M. Lorenzon, J. Töyräänvuori, J. Valk, T. Alstola, E. Bennett, R. Uotila and T. Auranne, eds. *RAI 69 Abstracts*. July 2024.
https://www.helsinki.fi/assets/drupal/2024-07/RaiAbstractBookAjoitettuJaPäivätty_1.pdf.
- [Tin19] S. Tinney. “ATF Inline Tutorial”. In: *Oracc: The Open Richly Annotated Cuneiform Corpus*. 18th Dec. 2019.
ORACC: doc/help/editinginatf/primer/inlinetutorial/index.html.
- [Van21] S. Vanséveren. *Unicode Cuneiform*. 10th Sept. 2021.
<http://hethiter.net/cuneifont>.

Modifications

The following summarizes modifications from the previous version of this document (L2/24-210).

- Attached a highlighted copy of the code charts summarizing the Script_Extensions property assignments.
- Clarified the descriptions of the Script and Script_Extensions property assignments in §1.
- Corrected the names of U+1245D  CUNEIFORM NUMERIC SIGN ONE THIRD-~~DISH~~ VARIANT FORM A and U+1245E  CUNEIFORM NUMERIC SIGN TWO THIRDS-~~DISH~~ VARIANT FORM A in names list cross references in §2.2.
- Corrected a typo in a citation of [Eng04] in §3.7.2.

**ISO/IEC JTC 1/SC 2/WG 2
PROPOSAL SUMMARY FORM TO ACCOMPANY SUBMISSIONS
FOR ADDITIONS TO THE REPERTOIRE OF ISO/IEC 10646¹.**

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:	<i>Archaic Cuneiform Numerals</i>
2. Requester's name:	<i>Robin Leroy</i>
3. Requester type (Member body/Liaison/Individual contribution):	<i>Individual contribution</i>
4. Submission date:	<i>2024-09-14</i>
5. Requester's reference (if applicable):	
6. Choose one of the following:	
This is a complete proposal:	<input checked="" type="checkbox"/> YES
(or) More information will be provided later:	<input type="checkbox"/>

B. Technical – General

1. Choose one of the following:		
a. This proposal is for a new script (set of characters):	<input checked="" type="checkbox"/> YES	
Proposed name of script:	<i>Archaic Cuneiform Numerals</i>	
b. The proposal is for addition of character(s) to an existing block:	<input type="checkbox"/>	
Name of the existing block:		
2. Number of characters in proposal:		
3. Proposed category (select one from below - see section 2.2 of P&P document):		
A-Contemporary <input type="checkbox"/>	B.1-Specialized (small collection) <input type="checkbox"/>	B.2-Specialized (large collection) <input type="checkbox"/>
C-Major extinct <input type="checkbox"/>	D-Attested extinct <input type="checkbox"/>	E-Minor extinct <input type="checkbox"/>
F-Archaic Hieroglyphic or Ideographic <input checked="" type="checkbox"/>	G-Obscure or questionable usage symbols <input type="checkbox"/>	
4. Is a repertoire including character names provided?	<input checked="" type="checkbox"/> YES	
a. If YES, are the names in accordance with the "character naming guidelines" in Annex L of P&P document?	<input checked="" type="checkbox"/> YES	
b. Are the character shapes attached in a legible form suitable for review?	<input checked="" type="checkbox"/> YES	
5. Fonts related:		
a. Who will provide the appropriate computerized font to the Project Editor of 10646 for publishing the standard?	<i>Robin Leroy</i>	
b. Identify the party granting a license for use of the font by the editors (include address, e-mail, ftp-site, etc.):	<i>Robin Leroy (eggrobin@unicode.org)</i>	
6. References:		
a. Are references (to other character sets, dictionaries, descriptive texts etc.) provided?	<input checked="" type="checkbox"/> YES	
b. Are published examples of use (such as samples from newspapers, magazines, or other sources) of proposed characters attached?	<input checked="" type="checkbox"/> 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)?	<input checked="" type="checkbox"/> 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? If YES explain		NO
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.)? If YES, with whom? If YES, available relevant documents:	<i>Karljürgen Feuerherm, Erica Scarpa, and Steve Tinney.</i> <i>This document.</i>	YES
3. Information on the user community for the proposed characters (for example: size, demographics, information technology use, or publishing use) is included? Reference:	<i>This document.</i>	YES
4. The context of use for the proposed characters (type of use; common or rare) Reference:		rare
5. Are the proposed characters in current use by the user community? If YES, where? Reference:	<i>Scholarly publications. This document, §3.4.5.</i>	YES
6. After giving due considerations to the principles in the P&P document must the proposed characters be entirely in the BMP? If YES, is a rationale provided? If YES, reference:		NO
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? If YES, is a rationale for its inclusion provided? If YES, reference:		NO
9. Can any of the proposed characters be encoded using a composed character sequence of either existing characters or other proposed characters? If YES, is a rationale for its inclusion provided? If YES, reference:		NO
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? If YES, is a rationale for its inclusion provided? If YES, reference:		NO
11. Does the proposal include use of combining characters and/or use of composite sequences? 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:		NO
12. Does the proposal contain characters with any special properties such as control function or similar semantics? If YES, describe in detail (include attachment if necessary)		NO
13. Does the proposal contain any Ideographic compatibility characters? If YES, are the equivalent corresponding unified ideographic characters identified? If YES, reference:		NO