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Late Babylonian Metrological Tables in the British Museum

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Introduction

Metrological tables contain lists of sexagesimal place value numbers with their corresponding measurement values in various systems of measurement. In contrast to the fairly large number of metrological tables known from the Old Babylonian period, comparatively few examples have been identified among Late Babylonian cuneiform tablets: in his study of the structure of metrological texts from the first millennium BC, Friberg lists only eight Late Babylonian metrological tables.[1] Of those eight tablets, three originate from Nippur, four from Uruk, and only a single example probably came from Babylon (see table 1). In this paper I publish a further eight metrological tables from the collection of the British Museum. These tablets are almost certainly all from Babylon. Their exact date is uncertain but they probably come from either the Achaemenid or the Seleucid period, although a Neo-Babylonian date cannot be excluded for some of them.[2]

Three different formats are attested for entries in metrological tables from the Late Babylon period:

(1) A sexagesimal place value number followed by a number and a unit. For example:

1,30	3	DANNA

(2) The unit followed by a number followed by a sexagesimal place value number. For example:

DANNA	3	1,30

[1] Friberg (1993). In addition Friberg describes two Neo-Assyrian tablets (one metrological list and one metrological table) and three Late Babylonian prose texts containing metrological information (one of which is on the same tablet as a metrological table).

[2] Most of the tablets use the old form for the number 9 comprising 9 wedges stacked in groups of three; the cursive three wedge form of 9, which becomes increasingly common in astronomical tablets throughout the Late Babylonian period, is attested only occasionally in the metrological tables. However, I am cautious about using this variation in the use of the different forms for the number 9 to provide evidence in support of an early date for the tablets. Rather, it may represent a genre-specific tradition of sign usage.

Tablet	Place of Origin	Publication
BM 51077	Presumed Babylon	Friberg (1993)
CBS 8539	Nippur	Hilprecht (1906)
CBS 11019	Nippur	Sachs (1947)
CBS 11032	Nippur	Sachs (1947)
W 22260a = SpTU I 101	Uruk	Hunger (1976)
W 22309a+b Rev. = SpTU I 102	Uruk	Hunger (1976)
W 22273 = SpTU IV 172	Uruk	von Weiher (1993)
W 23281 = SpTU IV 173	Uruk	von Weiher (1993)

Table 1. Previously published Late Babylonian metrological tables.

(3) A number followed by the unit followed by a sexagesimal place value number. For example:

3 DANNA 1,30

All three examples make a correspondence between 3 of the measurement unit DANNA (Akkadian: *bēru*) with the sexagesimal place value number 1,30. The correspondences found within in the table, therefore, are the same whether or not the entries are arranged (and perhaps therefore "read") from left to right or from right to left. In most cases, the number attached to the unit is an integer, a fraction or an integer with a fraction. Where there is no cuneiform sign for a required fraction, the sexagesimal place value number may be associated with a compound of two or more units (for example, 1 DANNA 5 UŠ). For reasons that are not clear, several tablets give essentially the same information in more than one of the three formats described above.

The texts edited here are all fairly small fragments and mostly duplicate material already known from the tablets from Uruk and Nippur. The primary importance of these tablets, therefore, lies not in the metrological information that they contain, but rather in demonstrating a common tradition of metrological tables, both in form and content, across the major cities of Babylonia during the Late Babylonian period. However, one tablet, BM 53287, is of interest in its own right. It contains a metrological table for length units that is not attested elsewhere. The table has several unique features, including entries for the subdivision of UŠ into *ašlu* (1 *ašlu* = 1/6 UŠ) and the appearance of unusually long sexagesimal numbers.

Table 2 summarizes the contents of the texts edited here.

Tablet	Section	Metrological System	Units (preserved)	Format
BM 36406	Obv. I	Length	DANNA ← 30 ← UŠ	1
	Obv. II	Length	NINDA	2
	Rev. I	Unknown	-	-
	Rev. II	Weight	MA.NA	3
	Rev. II	Unknown	-	-
BM 36954	I	Capacity	GÍN	3
	II	Unknown	-	1
BM 36972	I	Surface	GÁN ← 100 ← SAR	1
BM 37324	Obv.	Surface	GÍN ← 180 ← ŠE	1
	Rev.	Surface?	GÍN	1
BM 37437	Flake	Metal	ŠE	3
BM 37487	Obv.	Length	NINDA ← 12 ← KÙŠ	1
BM 40699		Fractions of GÍN	GÍN ← 180 ← ŠE	1
BM 53287	Obv.	Length	UŠ ← 6 ← *ašlu* ← 10 ← NINDA	1
	Rev.	Length	DANNA ← 30 ← UŠ	1

Table 2. Summary of the contexts of the metrological tables edited in this article.

Texts

BM 36406 (= 80-6-17, 132)
Photograph: Plate 1

Obverse

I

1′	⌜18⌝	[18	UŠ]
2′	19	19	[UŠ]
3′	20	2/3	D[ANNA]

4′	25	5/6	DAN[NA]
5′	30	1	DA[NNA]
6′	35	1	DANNA ⌜5 UŠ⌝
7′	40	1	DANNA 10 UŠ
8′	45	1	DANNA 1/2 DANNA
9′	50	1	DANNA 2/3 DANNA
10′	55	1	DANNA 5/6 DANNA
11′	1	2	DANNA
12′	⌜1⌝,30	3	DANNA
13′	⌜2⌝	4	DANNA
14′	[2,30]	⌜5⌝	DANNA
15′	[3	6]	DANNA
16′	[x	x	D]ANNA
17′	[x	x	DAN]NA
18′	[x	x	DAN]NA
19′	[x	x	DAN]NA

II

1′	[NINDA]	⌜4 1/2⌝	[4,30]
2′	[NINDA]	5	5
3′	NINDA	5 1/2	5,30
4′	NINDA	6	6
5′	NINDA	6 1/2	6,30
6′	NINDA	7	7
7′	NINDA	7 1/2	⌜7,30⌝
8′	NINDA	8	⌜8⌝
9′	NINDA	8 1/2	[8,30]
10′	NINDA	9	[9]
11′	NINDA	⌜9 1/2⌝	[9,30]

Reverse

I

1′	22 […]
2′	23 […]
3′	24 […]
4′	25 […]
5′	26 […]
6′	27 […]
7′	2⌜8⌝ […]

8′	2⌜9⌝ […]		
9′	⌜30⌝ […]		
10′	⌜x⌝ […]		

II

1′	[10	MA.N]A	10
2′	[11	MA.N]A	11
3′	[12	MA.N]A	12
4′	[13	MA].NA	13
5′	[14]	⌜MA⌝.NA	14
6′	⌜15⌝	MA.NA	15
7′	16	MA.NA	16
8′	17	MA.NA	17
9′	18	MA.NA	18
10′	19	MA.NA	19
11′	20	MA.NA	20
12′	30	MA.N[A	30]
13′	40	MA.[NA	40]
14′	⌜50	MA⌝.[NA	50]

III

1′	[…] x	
2′	[…] x	

Notes: Horizontal rulings mark the divisions between columns. The old form of ‘9’ is used. The obverse duplicates parts of Obv. II and III of SpTU IV 172.

BM 36954 (= 80-6-17, 695)
Photograph: Plate 1

Flake

I

1′	[3]	⌜GÍN	$3^{?}$⌝
2′	[4]	⌜GÍN	4
3′	[5]	⌜GÍN	5⌝
4′	[6]	⌜GÍN⌝	6
5′	⌜7⌝	GÍN	7

6′	⌜8⌝	GÍN	8
7′	9	GÍN	9
8′	⌜10⌝	GÍN	10
9′	[11]	⌜GÍN⌝	11
10′	[12]	⌜GÍN⌝	12
11′	[13	GÍN]	⌜13⌝

II

1′	⌜6,30⌝	[…]
2′	7	[…]
3′	7,30	[…]
4′	8	x […]
5′	8,30	x […]
6′	⌜9	x x⌝ […]
7′	⌜9,30	x⌝ […]
8′	10	⌜x⌝ […]
9′	15	[…]
10′	20	[…]

Notes: A horizontal ruling separates the columns. The old form of ‘9’ is used. Column I duplicates the last five lines of Rev. I and the first five lines of Rev. II of SpTU IV 172.

BM 36972 (= 80-6-17, 716)
Photograph: Plate 1

Flake from the right edge.

1′	[1,10]	1,10 SAR
2′	[1,20]	1,20 SAR
3′	[1,30]	1,30 SAR
4′	[1], ⌜40⌝	1(IKU) GÁN
5′	[2], ⌜30⌝	1(IKU) 1(UBU) GÁN
6′	[3],20	2(IKU) GÁN
7′	[4,10]	2(IKU) 1(UBU) GÁN
8′	⌜5⌝	3(IKU) GÁN
9′	[5], ⌜50⌝	3(IKU) 1(UBU) GÁN
10′	[6,40]	⌜4(IKU)⌝ GÁN

Notes: Duplicates part of Rev. II of SpTU IV 172.

BM 37324 (= 80-6-17, 1080)
Photograph: Plate 2

Obv.

1′	⌜9,40⌝	[…]
2′	10	IGI.6.⌜GÁL⌝.[LA GÍN?]
3′	11,40	KI.MIN ⌜5⌝ [ŠE]
4′	13,20	KI.MIN 10 ⌜ŠE⌝
5′	⌜15⌝	IGI.4.GÁL.LA ŠE!
6′	[16],40	KI.MIN 5 ŠE
7′	[18],20	KI.MIN 10 ŠE
8′	[20]	1/3 ŠE
9′	[30]	⌜1/2⌝ ŠE
10′	[40]	⌜2/3 ŠE⌝

Rev.

1′	[x]	[x]	10
2′	[x]	⌜GÍN⌝	15
3′	⌜x⌝	1/3	20
4′	1,30	1/2 GÍN	30
5′	2	2/3 GÍN	40
6′	2,30	5/6 GÍN	50
7′	3	x x GÍN	
8′	⌜x x⌝	[x x] ⌜GÍN⌝	

Notes: Fragment from a multi-column tablet; columns are separated by vertical rulings but only one column on each side is preserved. The old form of ‘9’ is used. The obverse duplicates part of Rev. I of SpTU IV 172. It contains entries of correspondences for GÍN and its subdivision ŠE where there are 180 ŠE in a GÍN. It is possible that the entry in line 5′ contains a scribal error and we should read GÍN rather than ŠE at the end of the line, which is what we find in the parallel entry on SpTU IV 172. However, in both this tablet and in SpTU IV 172 the entries corresponding to 20, 30 and 40 (Obv. 8′ to 10′ of the present tablet) give the fractions of GÍN with the unit ŠE instead of the expected GÍN, which may suggest that the GÍN in the range of ŠE is to be understood as implied.[3] The format of the entries on the reverse is unusual. It appears that the third column gives the equivalent sexagesimal reckoning of the fraction preceding the unit, where appropriate. Thus we should understand entries such as Rev. 6′ as: 2,30 = 5/6 GÍN = 0;50 GÍN).

[3] If so, then perhaps we should restore ŠE rather than GÍN at the end of Obv. 2′.

BM 37437 (= 80-6-17, 1194)
Photograph: Plate 2

Flake

1′	⌜1⌝[2	ŠE	4]
2′	13	[ŠE	4,20]
3′	14	[ŠE	4,40]
4′	15	[ŠE	5]
5′	1⌜6⌝	[ŠE	5,20]
6′	17	Š[E	5,40]
7′	18	ŠE	⌜6⌝
8′	19	ŠE	6,20
9′	20	ŠE	6,40
10′	[2]1	ŠE	7
11′	[2]⌜2⌝	ŠE	⌜7,20⌝
12′	[23]	⌜ŠE⌝	⌜7⌝,[40]

Notes: The old form of ‘9’ is used. Small traces of a vertical ruling are preserved to the right of the column. The same metrological system is presented on SpTU I 101 Obv. I but using format 1.

BM 37487 (= 80-6-17, 1244)
Photograph: Plate 2

Left edge preserved

Obv.

1′	[5]	1	K[ÙŠ]
2′	[6,40]	1 1/3	K[ÙŠ]
3′	⌜7⌝,30	1 ½	KÙŠ
4′	8,20	1 2/3	KÙŠ
5′	10	2	KÙŠ
6′	15	3	KÙŠ
7′	20	4	KÙŠ
8′	⌜25	5	KÙŠ⌝
9′	⌜30$^{?}$⌝	[1/2	NINDA]

Rev.

1′ traces only
2′ *šá* GIŠ-*šú* KI ITU-*šú* […]
3′ *a-na* EN-*šú* […]
4′ *li-tir-šú* […]
5′ […] ⌜ITU⌝ […]

Notes: Left edge preserved. The obverse duplicates part of Obv. I of SpTU IV 172. This table implies the correspondence 1 KÙŠ = 5 (not 1 KÙŠ = 1 as in some other Late Babylonian tables). The reverse, which is not a metrological table, is too fragmentary to translate or identify.

BM 40699 (= 81-4-28, 244)
Photograph: Plate 3

Top and both sides preserved.

Obv.

1′	[10]	1/2 ŠE
2′	[40]	2 ŠE
3′	[1]	3 ŠE
4′	⌜2⌝,30	7 1/2 ŠE *gír-ú*
5′	5	15 ŠE 2 *gír-ú*
6′	7,30	22 1/2 ŠE *pit-qa*
7′	10	15 ŠE 5 x x
8′	12	36 ŠE ⌜*hum-mu-šú*$^{?}$⌝
9′	15	45 ŠE 4-*tú*
10′	⌜20⌝	60(DIŠ+ŠU) ŠE *šal-šú* x 1 GIN
11′	[45	1.ME 35] ŠE 4-*tú* x
12′	[…	] x x

Rev.

1′	[7,30	22 1/2 ŠE *pi*]*t-qa*
2′	[10]	30 ŠE ⌜x x⌝
3′	12	36 ŠE ⌜*hum-mu-šú*$^{?}$ ⌝

4′	15	45 ŠE ⌜4⌝-*tú*
5′	20	60(DIŠ+ŠU) ŠE *šal-šú* GIN
6′	22,30	60(DIŠ+ŠU) 7 ½ 4 x x
7′	30	1,30 ŠE ½ GÍN
8′	⌜40⌝	⌜1.ME 20⌝ 2-*ta* ŠU.II.MEŠ
9′	[…]	[…] MEŠ

Notes: This small tablet contains a table for fractions of a GÍN. Each entry gives a sexagesimal number corresponding to a fraction of a GÍN expressed as numbers of ŠE (where 180 ŠE = 1 GÍN) followed by the name of the subunit of the GÍN.[4] For example, Obv. 6′ can be understood as 7,30 = 22½ ŠE = 1 *pitqa*.

This tablet is unusual in that both sides contain more or less the same text. On the reverse, the text is squeezed to the left with blank space to the right and contains entries corresponding to the sexagesimal numbers 22,30, 30 and 40 which appear to have been omitted on the obverse. The shape of the tablet is similar to that commonly used for letters during first millennium. The metrological list is almost identical with that found on a tablet from Nippur, CBS 11019, although that tablet contains many entries for intermediate values which have been omitted on the present tablet. The present tablet also contains an error in Obv. 7′: the sexagesimal value 10 should correspond to 30 ŠE. The correct entry is found on the reverse.

BM 53287 (= 82-3-23, 4321)
Photograph: Plate 3

Obv.

1′	[1], ⌜10? ⌝	1 UŠ *áš*-[*lu* …]
2′	[1],20	1 UŠ 2 ⌜NINNI$_5$⌝ […]
3′	1,30	1 UŠ 3 ⌜NINNI$_5$⌝ […]
4′	1,40	1 UŠ 4 ⌜NINNI$_5$⌝ […]
5′	1,52,30	1 UŠ 5 NINNI$_5$ ⌜5^{1} NINDA⌝ [x] ⌜x⌝
6′	⌜2⌝	2 UŠ
7′	⌜2⌝,25	2 UŠ 2 NINNI$_5$ ⌜5 NINDA⌝
8′	⌜2⌝,30	⌜2⌝ UŠ 3 NINNI$_5$
9′	⌜3⌝	3 UŠ
10′	[3], ⌜20⌝	3 UŠ 2 NINNI$_5$
11′	[3], ⌜40⌝	3 UŠ 4 NINNI$_5$
12′	[4]	4 UŠ

[4] On these names, which are also found in economical documents, see Sachs (1947) and Friberg (1993, 389).

13′	[4,30]	⌜4⌝ UŠ [3 $NINNI_5$]
14′	[5]	⌜5⌝ UŠ
15′	[x x]	[x] ⌜UŠ x⌝ […]

Rev.

1′	[…ｘ	x] DANNA […]
2′	[1]	⌜2⌝ DANNA
3′	[1,4]	⌜2⌝ DANNA 4 ⌜UŠ⌝
4′	[1,8	2 D]ANNA 8 ⌜UŠ⌝
5′	[1,30	3 DANN]A
6′	[1],35	⌜3⌝ [DANNA] 5
7′	⌜1⌝,36	3 [GAM] 6 ⌜UŠ⌝
8′	1,40	3 [GAM] 10 ⌜UŠ⌝
9′	1,4⌜2⌝	⌜3⌝ [GAM] 12 ⌜UŠ⌝
10′	1,45	3 1/2 D[ANN]A
11′	1,58	3 GAM [2]8 UŠ
12′	1,50	3 GAM 2/3 DANNA
13′	1, ⌜52⌝,30	3 GAM 2/3 [DANNA 2 UŠ 3 $NINNI_5$]
14′	1,53,20	3 GAM ⌜2/3⌝ [DANNA 3 UŠ 2 $NINNI_5$]
15′	[1],55	⌜3⌝ [GAM 2/3 DANNA 5 UŠ]

Notes: This tablet contains a metrological table for length units. Unlike other first millennium BC metrological tables for length, this table includes the unit *ašlu* “rope” as an intermediate unit between UŠ and NINDA,[5] which is written in phonetic Akkadian the first time it appears (where it stands for “1 *ašlu*”) and then subsequently using the logogram $NINNI_5$. A factor diagram for length units including *ašlu* is provided below:

DANNA ← 30 ← UŠ ← 6 ← *ašlu* ← 10 ← NINDA

On the reverse, the tablet uses the sign GAM to indicate “ditto” for the unit DANNA. Traces of what looks like GAM are preserved at the beginning of a few lines on the reverse. They presumably indicate the beginning of a new entry.

The presence of three-place sexagesimal numbers (1,52,30 and 1,53,20 found in Rev. 13′ and 14′) is unusual in metrological tables. Similarly, the distribution of sexagesimal numbers is unusual:[6] in most metrological tables the sexagesimal numbers increase line by line by a constant amount (for example, increasing by 0,30 each line), but

[5] The unit *ašlu* appears also in a Neo-Assyrian metrological text published by Thureau-Dangin (1926) (see also Friberg 1993, 391).

[6] The entry 1,58 in Rev. 11′ is probably an error for 1,48.

this tablet contains sequences of entries such as 1,30 1,35 1,36 1,40. These unusual features may suggest that this tablet was a one off composition by a scribe rather than a standard metrological list. This conclusion might be supported by the use of the cursive writing of '9' rather than the old 9-wedge form found which is generally found in metrological tables.

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Plate 1

BM 36406 Obv.

BM 36406 Rev.

BM 36954

BM 36972

Plate 2

BM 37324 Obv.

BM 37324 Rev.

BM 37437

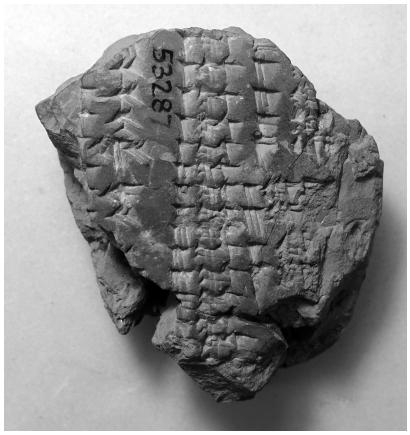
BM 37487 Obv.

BM 37487 Rev.

Plate 3

BM 40699 Obv.

BM 40699 Rev.



BM 53287 Obv.

BM 53287 Rev.

Edge

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