The babyloniannum package

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𒁹 Introduction

This package can be used to typeset Babylonian numerals using XeTeX or LuaTeX. It makes use of the Santakku Paleo-Babylonian font which can be downloaded at `http://www.hethport.uni-wuerzburg.de/cuneifont/`.

𒐕 Usage

`\babylonianfont`

Set the font used. Currently, only the Santakku font has been tested. Let me know if you get the package to work with other fonts.

Example usage: `\babyloninanfont{Santakku}`

`\babyloniannum`

This is the main macro of this package. It takes a number between 1 and 59 as argument and typesets it with Babylonian numerals.

Example usage:

`\babyloninannum{424000}` is 𒁹 𒌋𒐖 𒌋𒐖 𒌋 (1,57,46,40 in base 60)

`\babyloninannum{21609}` is 𒐖 𒐖 (6,0,9 in base 60)

`\babylonian`

Like `\arabic` or `\roman`, this macro takes a counter name as argument and returns its Babylonian representation.

For example, this documentation is typeset with:

```
\renewcommand{\thesection}{\babylonian{section}}
```

`\unicodedisp`

This macro lets you print characters using their unicode reference. It is used by `\babyloniannum` to display Babylonian numbers.

Example usage: `\unicodedisp{1230B}`

𒐕 Known issues

𒐕.𒐙 Glyph for 20

The glyph for number 20 was not found in the Santakku font. Therefore, it has been replaced by the combination of two 10 glyphs, with a kerning adjustment.

𒐕.𒐕 Glyph for 0

The Babylonian system has no glyph for 0, which is represented by a large space. In this package, 0 is implemented as a 0.5em kerning space.

𒐕.𒐕 Multiples of 60

The Babylonian numeral system is a sexagesimal system (a positional base 60 system), which does not feature a glyph for 0. Therefore, a number such as 𒌋𒐕 can stand for 23, 23×60 or $23 \times 60 \times 60$ or even $23/60$. Only the context allows to decide which number is represented.

𒀸 Table of characters

Below is a sample list of Babylonian characters this package can typeset:

1	𒁹	41	𒎌𒁹	81	𒁹 𒌋𒁹
2	𒁺	42	𒎌𒁺	82	𒁹 𒌋𒁺
3	𒁻	43	𒎌𒁻	83	𒁹 𒌋𒁻
4	𒁼	44	𒎌𒁼	84	𒁹 𒌋𒁼
5	𒁽	45	𒎌𒁽	85	𒁹 𒌋𒁽
6	𒁾	46	𒎌𒁾	86	𒁹 𒌋𒁾
7	𒁿	47	𒎌𒁿	87	𒁹 𒌋𒁿
8	𒂀	48	𒎌𒂀	88	𒁹 𒌋𒂀
9	𒂁	49	𒎌𒂁	89	𒁹 𒌋𒂁
10	𒂂	50	𒎌	90	𒁹 𒌋
11	𒂃	51	𒎌𒁹	91	𒁹 𒌋𒁹
12	𒂄	52	𒎌𒁺	92	𒁹 𒌋𒁺
13	𒂅	53	𒎌𒁻	93	𒁹 𒌋𒁻
14	𒂆	54	𒎌𒁼	94	𒁹 𒌋𒁼
15	𒂇	55	𒎌𒁽	95	𒁹 𒌋𒁽
16	𒂈	56	𒎌𒁾	96	𒁹 𒌋𒁾
17	𒂉	57	𒎌𒁿	97	𒁹 𒌋𒁿
18	𒂊	58	𒎌𒂀	98	𒁹 𒌋𒂀
19	𒂋	59	𒎌𒂁	99	𒁹 𒌋𒂁
20	𒂌	60	𒁹	100	𒁹 𒎌
21	𒂍	61	𒁹 𒁹	101	𒁹 𒎌𒁹
22	𒂎	62	𒁹 𒁺	102	𒁹 𒎌𒁺
23	𒂏	63	𒁹 𒁻	103	𒁹 𒎌𒁻
24	𒂐	64	𒁹 𒁼	104	𒁹 𒎌𒁼
25	𒂑	65	𒁹 𒁽	105	𒁹 𒎌𒁽
26	𒂒	66	𒁹 𒁾	106	𒁹 𒎌𒁾
27	𒂓	67	𒁹 𒁿	107	𒁹 𒎌𒁿
28	𒂔	68	𒁹 𒂀	108	𒁹 𒎌𒂀
29	𒂕	69	𒁹 𒂁	109	𒁹 𒎌𒂁
30	𒂖	70	𒁹 𒂂	110	𒁹 𒎌
31	𒂗	71	𒁹 𒂃	111	𒁹 𒎌𒁹
32	𒂘	72	𒁹 𒂄	112	𒁹 𒎌𒁺
33	𒂙	73	𒁹 𒂅	113	𒁹 𒎌𒁻
34	𒂚	74	𒁹 𒂆	114	𒁹 𒎌𒁼
35	𒂛	75	𒁹 𒂇	115	𒁹 𒎌𒁽
36	𒂜	76	𒁹 𒂈	116	𒁹 𒎌𒁾
37	𒂝	77	𒁹 𒂉	117	𒁹 𒎌𒁿
38	𒂞	78	𒁹 𒂊	118	𒁹 𒎌𒂀
39	𒂟	79	𒁹 𒂋	119	𒁹 𒎌𒂁
40	𒂠	80	𒁹 𒂌	120	𒁻

𒀸 Implementation

```
\ProvidesPackage{babyloniannum}
\RequirePackage{fontspec}
\RequirePackage{xunicode}
\RequirePackage{numname}
```

\babylonianfont

```
\newcommand{\babylonianfont}{Santakku}
```

\unicodedisp

```
\newcommand{\unicodedisp}[1]{\char"#1}
```

\babylonian

```
\newcommand{\babylonian}[1]{%
  \protect\babyloniannum{\arabic{#1}}}
```

\babylonianglyph

```
\newcommand{\babylonianglyph}[1]{%
\ifnum #1 > \z@ % glyph is not zero
  \chardef\m@mten=10 % cuts by units of 10
  \numdigits{#1} % parse number
  \ifcase\c@xsm@mctr %
    \relax %
    \or
    \unicodedisp{1230B} %10
    \or
    \unicodedisp{1230B}\kern-1.5pt{}\unicodedisp{1230B} %20 -- unknown?
    \or
    \unicodedisp{1230D} %30
    \or
    \unicodedisp{1240F} %40
    \or
    \unicodedisp{12410} %50
  \fi
  \ifnum \c@ism@mctr > \z@ %
    \ifnum \c@xsm@mctr > \z@ %
  \kern-0.5em{} % make glyphs closer
    \fi %
  \fi %
  \ifcase\c@ism@mctr %
    \or
    \unicodedisp{12079} %1
    \or
    \unicodedisp{1222B} %2
    \or
    \unicodedisp{12408} %3
    \or
    \unicodedisp{120FB} %4
    \or
```

```
    \unicodedisp{1240A} %5
    \or
    \unicodedisp{1240B} %6
    \or
    \unicodedisp{1240C} %7
    \or
    \unicodedisp{1240D} %8
    \or
    \unicodedisp{1240E} %9
  \fi
  \addtocounter{baby@glyphs}{1}%
\else
  \ifnum\c@baby@glyphs > \z@ %
\kern0.5em{}% empty space for zero
  \fi
\fi
}
```

\babylonian@setcounters

```
\newcounter{baby@ism@mctr}  % "units"
\newcounter{baby@xsm@mctr}  % "tens"
\newcounter{baby@csm@mctr}  % "hundreds"
\newcounter{baby@ksm@mctr}  % "thousands"
\newcounter{baby@xksm@mctr} % "ten thousands"
\newcounter{baby@cksm@mctr} % "hundred thousands"
\newcounter{baby@msm@mctr}  % "millions"
\newcounter{baby@xmsm@mctr} % "ten millions"
\newcounter{baby@cmsm@mctr} % "hundred millions"
\newcounter{baby@bsm@mctr}  % "billions"
\newcommand{\babylonian@setcounters}{%
  \setcounter{baby@ism@mctr}{\c@ism@mctr}%
  \setcounter{baby@xsm@mctr}{\c@xsm@mctr}%
  \setcounter{baby@csm@mctr}{\c@csm@mctr}%
  \setcounter{baby@ksm@mctr}{\c@ksm@mctr}%
  \setcounter{baby@xksm@mctr}{\c@xksm@mctr}%
  \setcounter{baby@cksm@mctr}{\c@cksm@mctr}%
  \setcounter{baby@msm@mctr}{\c@msm@mctr}%
  \setcounter{baby@xmsm@mctr}{\c@xmsm@mctr}%
  \setcounter{baby@cmsm@mctr}{\c@cmsm@mctr}%
  \setcounter{baby@bsm@mctr}{\c@bsm@mctr}%
}
```

\babyloniannum

```
\newcounter{baby@glyphs}%
\newcommand{\babyloniannum}[1]{%
  \chardef\m@mten=60 % Cut by units of 60
  \numdigits{#1} % Parse number
  \babylonian@setcounters%
  {\fontspec{\babylonianfont}%
  \mbox{%
```

```
  \setcounter{baby@glyphs}{0}%
  \babylonianglyph{\c@baby@bsm@mctr}%
  \babylonianglyph{\c@baby@cmsm@mctr}%
  \babylonianglyph{\c@baby@xmsm@mctr}%
  \babylonianglyph{\c@baby@msm@mctr}%
  \babylonianglyph{\c@baby@cksm@mctr}%
  \babylonianglyph{\c@baby@xksm@mctr}%
  \babylonianglyph{\c@baby@ksm@mctr}%
  \babylonianglyph{\c@baby@csm@mctr}%
  \babylonianglyph{\c@baby@xsm@mctr}%
  \babylonianglyph{\c@baby@ism@mctr}%
  }}
}
```