The \texttt{babyloniannum} package

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\section*{Introduction}
This package was created as an answer to a question\footnote{http://tex.stackexchange.com/questions/25939/typesetting-babylonian-numerals/25947#25947} about typesetting Babylonian numerals asked on \url{http://tex.stackexchange.com}.

This package allows to typeset Babylonian numerals using \TeX{} or \LaTeX{}. It makes use of the Santakku Paleo-Babylonian TrueType font which can be downloaded at \url{http://www.hethport.uni-wuerzburg.de/cuneifont/}.

\section*{Usage}
\begin{enumerate}
\item \texttt{\babyloniannumfont} \\
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: \texttt{\babyloniannumfont{Santakku}}

\item \texttt{\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:
\begin{verbatim}
\babyloniannum{424000} is 𒈫𒐐𒐌 𒐏𒐋 𒐏 (1,57,46,40 in base 60)
\end{verbatim}

\begin{verbatim}
\babyloniannum{21609} is 𒐋 𒐎 (6,0,9 in base 60)
\end{verbatim}

\item \texttt{\babylonian} \\
Like \texttt{\arabic} or \texttt{\roman}, this macro takes a counter name as argument and returns its Babylonian representation.

For example, this documentation is typeset with:
\begin{verbatim}
\renewcommand{\thesection}{\babylonian{section}}
\end{verbatim}

\item \texttt{\unicodedisp} \\
This macro lets you print characters using their unicode reference. It is used by \texttt{\babyloniannum} to display Babylonian numbers.

Example usage: \texttt{\unicodedisp{1230B}}
\end{enumerate}
## Table of characters

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

<table>
<thead>
<tr>
<th>Number</th>
<th>Character</th>
<th>Number</th>
<th>Character</th>
<th>Number</th>
<th>Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>𒐈</td>
<td>41</td>
<td>𒐈</td>
<td>81</td>
<td>𒐈</td>
</tr>
<tr>
<td>2</td>
<td>𒐈</td>
<td>42</td>
<td>𒐈</td>
<td>82</td>
<td>𒐈</td>
</tr>
<tr>
<td>3</td>
<td>𒐈</td>
<td>43</td>
<td>𒐈</td>
<td>83</td>
<td>𒐈</td>
</tr>
<tr>
<td>4</td>
<td>𒐈</td>
<td>44</td>
<td>𒐈</td>
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<td>𒐈</td>
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<tr>
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<tr>
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<td>48</td>
<td>𒐈</td>
<td>88</td>
<td>𒐈</td>
</tr>
<tr>
<td>9</td>
<td>𒐈</td>
<td>49</td>
<td>𒐈</td>
<td>89</td>
<td>𒐈</td>
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<tr>
<td>10</td>
<td>𒐈</td>
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<td>𒐈</td>
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<td>11</td>
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<td>𒐈</td>
<td>91</td>
<td>𒐈</td>
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<tr>
<td>12</td>
<td>𒐈</td>
<td>52</td>
<td>𒐈</td>
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<td>𒐈</td>
</tr>
<tr>
<td>13</td>
<td>𒐈</td>
<td>53</td>
<td>𒐈</td>
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<td>𒐈</td>
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<tr>
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<td>𒐈</td>
<td>97</td>
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<tr>
<td>18</td>
<td>𒐈</td>
<td>58</td>
<td>𒐈</td>
<td>98</td>
<td>𒐈</td>
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<tr>
<td>19</td>
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<td>59</td>
<td>𒐈</td>
<td>99</td>
<td>𒐈</td>
</tr>
<tr>
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<td>𒐈</td>
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<tr>
<td>23</td>
<td>𒐈</td>
<td>63</td>
<td>𒐈</td>
<td>103</td>
<td>𒐈</td>
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<tr>
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<td>𒐈</td>
<td>64</td>
<td>𒐈</td>
<td>104</td>
<td>𒐈</td>
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<td>𒐈</td>
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<tr>
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<td>68</td>
<td>𒐈</td>
<td>108</td>
<td>𒐈</td>
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<td>80</td>
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<td>120</td>
<td>.bitmap</td>
</tr>
</tbody>
</table>
Known issues

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.

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.

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 𒌋 𒌋𒐈 can stand for 23, 23 × 60 or 23 × 60 × 60 or even 23/60. Only the context allows to decide which number is represented.

Implementation

```
\ProvidesPackage{babyloniannum}
\RequirePackage{fontspec}
\RequirePackage{xunicode}
\RequirePackage{numname}
\babylonianfont
5 \newcommand{\babylonianfont}{Santakku}
\unicodedisp
6 \newcommand{\unicodedisp}[1]{\char"#1}
\babylonian
7 \newcommand{\babylonian}[1]{%
8 \protect\babyloniannum{\arabic{#1}}}
\babylonianglyph
9 \newcommand{\babylonianglyph}[1]{%
10 \ifnum #1 > z0 % glyph is not zero
11 \chardef\m@mten=10 % cuts by units of 10
12 \numdigits{#1} % parse number
13 \ifcase\c@xsm@mctr %
14 \relax %
15 \or
16 \unicodedisp{1230B} %10
17 \or
18 \unicodedisp{1230B}\kern-0.15em{}\unicodedisp{1230B} %20 -- unknown?
19 \or
```
\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{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@ten=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@bsm@mctr}%
    \babylonianglyph{c@baby@bsm@mctr}%
    \babylonianglyph{c@baby@bsm@mctr}%
    \babylonianglyph{c@baby@bsm@mctr}%
    \babylonianglyph{c@baby@bsm@mctr}%
  }
}
}