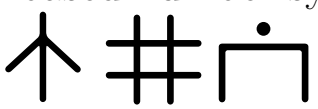
Power-based number system



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jan loje, Shaevor, jan Tamalu

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1 Power-based number system for toki pona

Written by jan loje with the help of jan Tamalu and Shaevor (mistakes are mine only)

This proposal should be:

1. based on the common positional-digit decimal system,
2. unambiguous,
3. easy to understand, learn, and use for all common non-scientific and non-mathematical purposes,
4. suitable for *toki pona*.

2 Vocabulary

The ideas for the choice of the names are indicated between square brackets [ ]

1	wan	𐤁	one
2	tu	𐤂	two
3	sin	𐤃	three [3 lines]
4	lipu	𐤄	four [4 sides]
5	luka	𐤅	five [toki pona hand]
6	pipi	𐤆	six [6 elements]
7	len	𐤇	seven [4 sides + 3 lines]
8	musi	𐤈	eight; two circles look like a kind of 8
9	suli	𐤉	nine [the ”big” digit]
10	sewi	𐤊	10 (base) followed by integer powers (1 is implicit): 2, 3, 4,... [raise]
20	tu sewi	𐤂𐤊	two × ten
30	sin sewi	𐤃𐤊	three × ten
100	sewi tu	𐤊𐤂	10^2
300	sin sewi tu	𐤃𐤊𐤂	three × ten^2
1000	sewi sin	𐤊𐤃	10^3
+	en	+	addition
-	weka	𐤋	negative [toki pona subtract]
.	sike	𐤌	separator for decimal part
№	nanpa	𐤍	number prefix (ordinal)*
#	mute	𐤎	number prefix (cardinal)

*NOTE: compare Philipino ika- or pang-, Malay and Indonesian ke-, Chinese 第

3 Use

3.1 Prefixes (when needed)

Ordinal and cardinal numbers.
nanpa #: ordinal number
mute |||: cardinal number

ona li nanpa luka = it's the 5th (ordinal)
ona li mute luka = it's 5 (cardinal)

3.2 Positional digits

The values of digits are *positional* (common usage)

That is $212 = 2 \times 10^2 + 1 \times 10^1 + 2 \times 10^0$

12 = *wan tu*
2024 = *tu ala tu lipu*

3.3 Numbers as powers of 10

***sewi* is the base 10 for all powers.**

$1000 = 10^3$= *sewi sin*
$10\ 000 = 10^4$= *sewi lipu*
...
$1\ 000\ 000\ 000 = 10^9$= *sewi suli*

jan li jo e $1,000,000,000
reading: *jan li jo e mani Mewika pi mute sewi suli*

3.4 Very large (or small) numbers

Very large (or small) numbers can be expressed easily.

a googol = 10^{100} = sewi wan ala ala
or
10^{10^2} = sewi sewi tu

3.5 Composed numbers

Numbers with multiplicative and additive values.

The number to the left of *sewi* has multiplicative value.

The additive value of a number (sequence) is stated explicitly with *en*.

$4\ 000\ 000\ 012 = 4 \times 10^9 + 12$ = *lipu sewi suli en wan tu*

3.6 Numbers with fractional parts

Number with a fractional part separated by a decimal point.

3.14 = *sin sike wan lipu*

$3.14 = 314 \times 10^{-2}$ = *sin wan lipu sewi weka tu*

3.7 Numbers with negative exponents

Negative exponents are prefixed by *weka*.

6.62×10^{-34} = *pipi sike pipi tu sewi weka sin lipu*

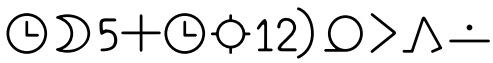
3.8 Dates

ISO 8601 system

2024-05-12 = *tenpo sike tu ala tu lipu en tenpo mun luka en tenpo suno wan tu*

5-12 ona li kama lon = His birthday is May 12th

reading: *tenpo mun luka en tenpo suno wan tu la ona li kama lon*



3.9 Conflict with other number systems

In other to reduce the conflict with other toki-pona number systems, the numbers could be written with the usual digits (0-9), i.e. not "spelled-out":

Ex. 3: *4-3 ona li kama lon* = His birthday is April 3rd

reading*: tenpo mun lipu en tenpo suno sin la ona li kama lon*