

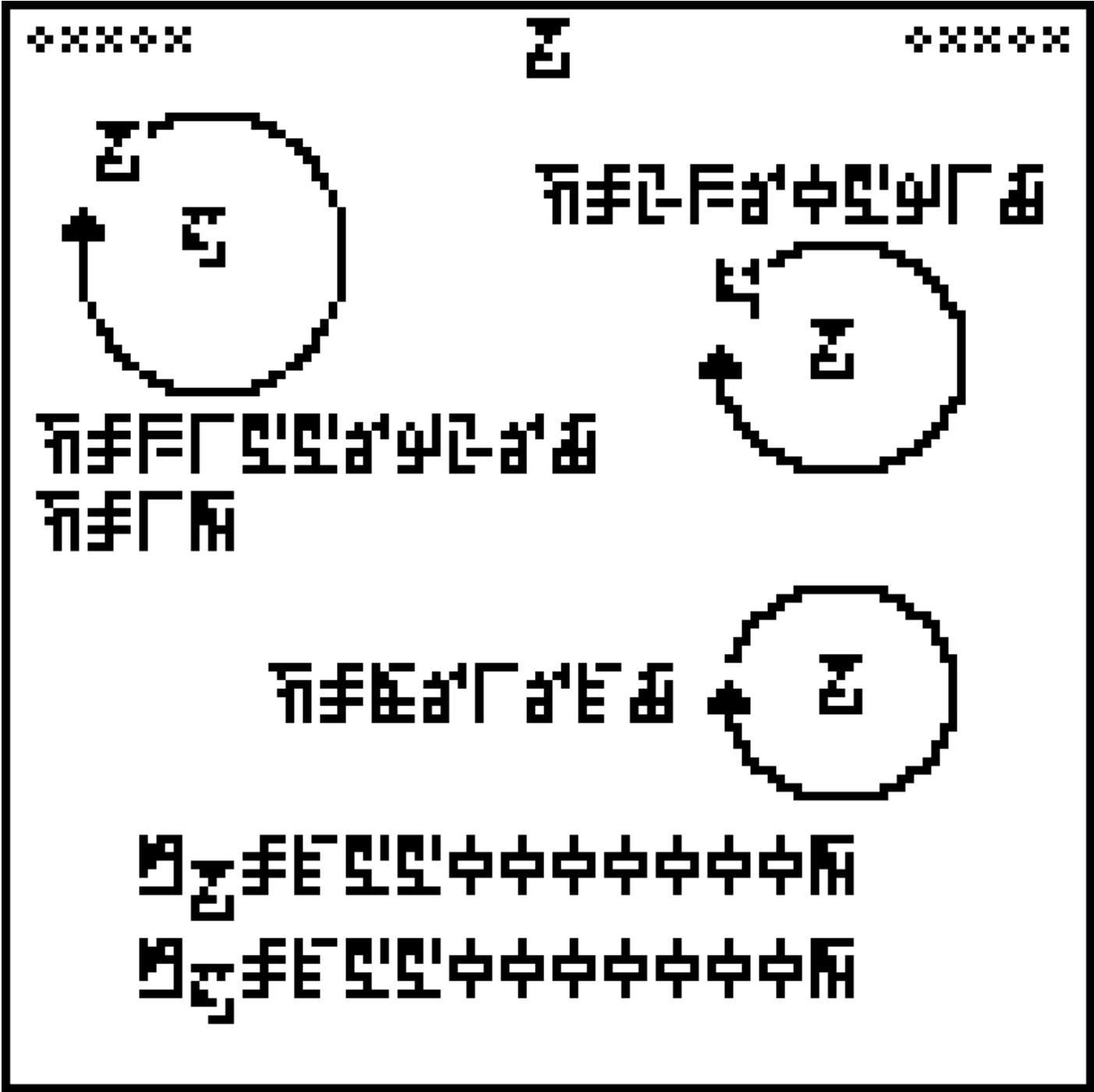
The Universe of Discourse

Wed, 23 Sep 2015

A message to the aliens, part 13/23 (days, months, and years)

Earlier articles: [Introduction](#) [Common features](#) [Page 1 \(numerals\)](#) [Page 2 \(arithmetic\)](#) [Page 3 \(exponents\)](#) [Page 4 \(algebra\)](#) [Page 5 \(geometry\)](#) [Page 6 \(chemistry\)](#) [Page 7 \(mass\)](#) [Page 8 \(time and space\)](#) [Page 9 \(physical units\)](#) [Page 10 \(temperature\)](#) [Page 11 \(solar system\)](#) [Page 12 \(Earth-Moon system\)](#)

This is page 13 of the [Cosmic Call](#) message. An explanation follows.

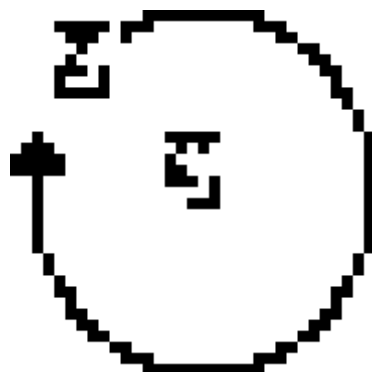






The 10 digits are:

0 1 2 3 4 5 6 7 8 9



There are three diagrams on this page, each depicting something going around. Although the direction is ambiguous (unless you understand arrows) it should at least should be clear that all three rotations are in the same direction. This is all you can reasonably say anyhow, because the rotations would all appear to be going the other way if you looked at

them from the other side.



The upper left diagram depicts the Earth  going around the Sun  and underneath is a note that says that the time  is equal to 315569268 seconds, and is also equal to one year . This defines the year.




The upper-right diagram depicts the Moon  going around the Earth ; the notation says that this takes 2360591 seconds, or around $27\frac{1}{2}$ days. This is not the $29\frac{1}{2}$ days that one might naïvely expect, because it is the sidereal month rather than the synodic month. Suppose the phase of the Moon is new, so that the Moon lies exactly between the Earth and the Sun. $27\frac{1}{2}$ days later the Moon has made a complete trip around the Earth, but because the Earth has moved, the Moon is not yet again on the line between the Earth and the Sun; the line is in a different direction. The Earth has moved about $\frac{1}{12}$ of the way around the sun, so it takes about another $\frac{1}{12} \cdot 27\frac{1}{2}$ days before the moon is again between Earth and Sun and so a total of about $29\frac{1}{2}$ days between new moons.

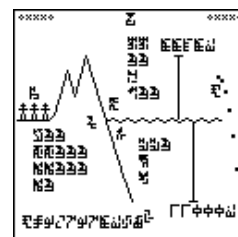


The lower-right diagram depicts the rotation of the Earth, giving a time of 86163 seconds for the day. Again, this is not the 86400 seconds one would expect, because it is the sidereal day rather than the solar day; the issue is the same as in the previous paragraph.

None of the three circles appears to be circular. The first one is nearly circular, but it looks worse than it is because the Sun has been placed off-center. The curve representing the Moon's orbit is decidedly noncircular. This is reasonable, because the Moon's orbit is elliptical to approximately the same degree. In the third diagram, the the curve is intended to represent the surface of the Earth, so its eccentricity is indefensible. The ellipse is not the same as the one used for the Moon's orbit, so it wasn't just a copying mistake.

The last two lines state that the ages of the Sun and the Earth are each 4550000000 years. This is the first appearance of the glyph  for "age".

The [next article](#) will discuss page 14, shown at right. (Click to enlarge.) Try to figure it out before then.



[\[Other articles in category /aliens/dd\]](#) [permanent link](#)