BASE NEGATIVE TEN

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Although it is not commonly known, a species similar to Homosapiens lives on planet X in a universe on the other side of a black hole. They use a base negative ten system of numeration. In order to exchange mathematical knowledge, there is a need for earthling translators who are familiar with the arithmetic algorithms of the Xlings. This article on base negative ten is being written in the hope that it will inspire some readers with an adventuresome spirit and a healthy mathematical curiosity to prepare for this post.

The base negative ten system of numeration employs ten symbols, none of which can be found on this keyboard. Hence, we shall utilize the numerals $0, 1, 2, \ldots, 9$ rather than those actually used by the Xlings.

The Xlings adhere to the following interuniversal principle of number bases:

INTERUNIVERSAL PRINCIPLE OF NUMBER BASES: In base b, the kth digit to the left of the "decimal" point indicates the number of b^{k-1}'s. The kth digit to the right of the decimal point indicates the number of b^{-k}'s.

So in base -10, the digits are used as follows:

$$\ldots \quad \overset{\_}{(-10)^3} \quad \overset{\_}{(-10)^2} \quad \overset{\_}{(-10)^1} \quad \overset{\_}{(-10)^0} \quad \cdot \quad \overset{\_}{(-10)^{-1}} \quad \overset{\_}{(-10)^{-2}} \quad \overset{\_}{(-10)^{-3}} \quad \ldots$$

Thus, the Xling's numeral "34" would be translated to $3(-10)+4$ or -26 on earth. Similarly, 124 in base negative ten represents our

$$1(-10)^2 + 2(-10) + 4 = 84.$$

Counting (that is, adding 1). The Xlings and the Earthlings both begin counting 1,2,3,4,5,6,7,8,9. However, while on earth, 1 more than 9 is 10, on planet X 1 more than 9 is (think about this before reading on).

Did you figure it out? $9 + 1 = 190$ in base negative ten, since 190 would translate to $1(100) + 9(-10) + 0$ or 10 on earth. After 190 comes 191, then $192, 193, \ldots, 198, 199, 180$.

And now one of the superior features of using base negative ten becomes evident. Whereas on earth we are encumbered with using a negative sign to denote negative numbers, no such sign is necessary on planet X. That is, all negative (as well as positive) numbers can be expressed in base negative ten without using the negative sign! For example, earth's -7 is equivalent to Xling's 13.