EXTENDING THE NUMBER NAMES

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In the February 1968 issue of Word Ways, Dmitri Borgmann briefly reviewed the history of number nomenclatures. The first twenty number names, each one denoting a number one thousand times its immediate predecessor, are found in many reference works:

1. million	6. sextillion	11. undecillion	16. sexdecillion
2. billion	7. septillion	12. doudecillion	17. septendecillion
3. trillion	8. octillion	13. tredecillion	18. octodecillion
4. quadrillion	9. nonillion	14. quattuordec.	19. novemdecillion
5. quintillion	10. decillion	15. quindecillion	20. vigintillion

In the appendix of Edward Brooks' Philosophy of Arithmetic, published in 1904, one Professor Henkle devised a nomenclature which extended this list to the millionth name. Dmitri Borgmann commented on various logological inconsistencies in Henkle's list, and invited Word Ways readers to improve upon it.

In the May 1968 issue, Rudolph Ondrejka submittted an improved nomenclature which extended the list from the millionth to the billionth name. It is the purpose of this article to extend the nomenclature yet further, beginning where Henkle and Ondrejka left off.

In order to discuss extremely large numbers, it is necessary to introduce some notation. The numbers in front of the twenty names above are the periods associated with the names; more formally, the number of zeros in the number is equal to 3(period) + 3. To keep track of the different number names, we associate each one with its period, as has been done in the list above. However, the numbers we will deal with are so colossal that their periods must be expressed in abbreviated notation; in particular, we write the logarithm of the period to the base ten instead of the period itself. Thus, the log period of the number name decillion is 10 to the first power, or 1; similarly, the log period of the number name vigintillion is 10 to the 1.4142 power.

Before presenting the new number names, it is necessary to explain the strategy underlying their formation. In Ondrejka's list, the number with log period 6 (that is, the millionth period) is called milli-millillion, and the number with log period 9 is called milli-millimillillion. Thus, the number with log period 12 must be called milli-millimillimillillion, and so on; these names become exceedingly unwieldy. To get around this, we propose to recycle the names from the original list in slightly modified form; that is, we keep the name millillion (analogous to million), but replace milli-millillion with billillion (analogous to billion), milli-millimillillion with trillillion (analogous to trillion) and so on. In general, each number name with period i has a cognate with log period 3i.

To avoid boring the reader with endless names, we present full number names with log periods of 3, 30, 300, etc., corresponding to number names with periods 1, 10, 100, etc. The prefixes of intermediate cases are briefly indicated in indented form for the first three cycles; after that time they repeat in an obvious manner.

3 mi/llillion (cognate to million)
(6 bi/, 9 tri/, 12 quadri/, 15 quinti/, 18 sexti/, 21 septi/, 24 octi/, 27 noni/)

30 deci/llillion (cognate to decillion)
(60 vici/, 90 trici/, 120 quadragi/, 150 quinquagi/, 180 sexagi/, 210 septuagi/, 240 octogi/, 270 nonagi/)

300 /centillillion (cognate to centillion)
(600 du/, 900 tre/, 1200 quadri/, 1500 quin/, 1800 sex/ 2100 septi/, 2400 octi/, 2700 nona/)

3000 millesillillion (cognate to millillion)
30000 decillesillillion (cognate to decillillion)
300000 centillesillillion (cognate to centillillion)

3000000 millillesillillion (cognate to millesillillion)
30000000 decillillesillillion (cognate to decillesillillion)
300000000 centillillesillillion (cognate to centillesillillion)

For the record, the largest number name we have devised is nonacentillillesillillion, with a log period of 2700000000. To demonstrate how far we have come, we remind the reader that Henkle's list stopped at log period 6 (our billillion), and Ondrejka's at log period 9 (our trillillion). Numbers as large as this have no practical use in economics or, for that matter, physics or astronomy; it is only in the realm of pure mathematics that they can be found. For example, if one takes a billion different objects and asks in how many distinguishable ways these can be arranged in a line, the answer would lie in the general region of the largest number above.

Does any reader of Word Ways know of a specifically-named finite number which is larger than any of the ones given above? Googolplex is often cited as a very large number, but it is somewhat less than one quadragillillion. On the other hand, Skewes' number is not exceeded until the nine major number names given above have been extended to thirty-five.