# NUMBERS

In dealing with large numbers, scientists use the notation of 10 raised to various powers to eliminate a profusion of zeros. For example, 19.16 trillion miles would be written $1.916 \times 10^{12}$ miles. Similarly, a very small number, for example 0.0000154324 of a gram, would be written $1.54324 \times 10^{-5}$. Of the prefixes used before numbers the smallest is "atto" from the Danish or Norwegian *atten*, for 18, symbol a, indicating $10^{-18}$ of a unit. The highest is "exa" *(Greek, hexa, six, i.e. six groups of three zeros)*, symbol E, indicating $10^{18}$.

**Highest numbers.** The highest lexicographically accepted named number in the system of successive powers of ten is the centillion, first recorded in 1852. It is the hundredth power of a million, or one followed by 600 zeros.

The number $10^{100}$ is designated a Googol. The term was suggested by the nine-year-old nephew of Dr. Edward Kasner (US) (d. 1955). Ten raised to the power of a Googol is described as a Googolplex. Some conception of the magnitude of such numbers can be gained when it is said that the number of electrons in some models of the observable Universe does not exceed $10^{87}$. The highest named number outside the decimal notation is the Buddhist *asankhyeya*, which is equal to $10^{140}$ and mentioned in Jain works of *c.* 100 B.C. The highest number ever used in a mathematical proof is a bounding value published in 1977 and known as Graham's number. It concerns bichromatic hypercubes and is inexpressible without the special "arrow" notation, devised by Knuth in 1976, extended to 64 layers.