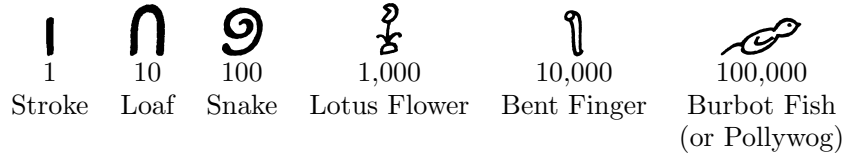








































tive positional system that includes signs to distinguish tens (st'wt) from units (st't);¹⁶⁷ and none has a zero.

Like the Sumerians, the Egyptians began with a grouping system of numbers. Grouping systems have names for 1 and powers of their base b , for example, in the case of base 10, 10^1 , 10^2 , 10^3 Hieroglyphs for numerals included



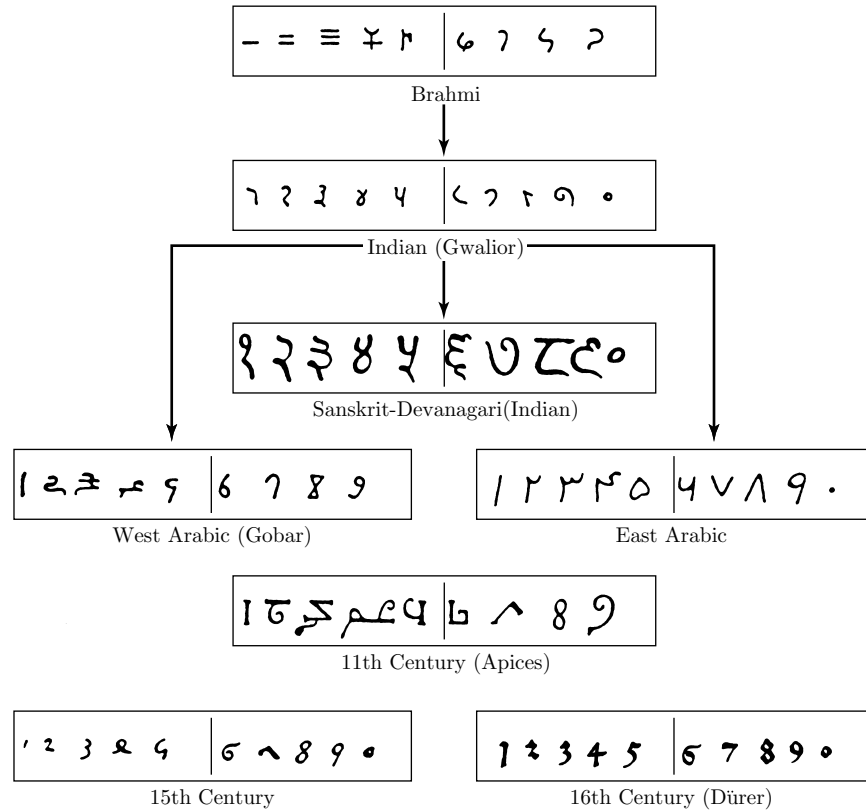
The Egyptians formed intermediate values by repeating each symbol the required number of times, thus  represents 35. Herodotus reports that the Egyptians customarily wrote numbers and calculated from right to left. Large numbers occurring in records of royal estates and the logistics and engineering of the pyramids required much space.

	1	2	3	4	5	6	7	8	9
Units									
Tens									
Hundreds									
Thousands									
Tens of thousands									

Egyptian multiples of powers of 10

The later hieratic system, as in the A'hmosè Papyrus, and the demotic decimal system were ciphered. This means that Egyptian scribes gave names not only to 1 and powers of base 10, but also to multiples of those powers 20, 30, . . . , and 200, 300, and so on. This represents an important development in numeration, because it eliminates the cumbersome repetition of symbols in forming numbers. It remains an integral part of modern numeration. In the A'hmosè Papyrus the number 1025 would be written (from left to right) as

the distinct *huruf al-ghubar* (letters of dust) developed in Spain for use on the dust abacus. The chart here shows that our modern numerals are similar to the *ghubar* numerals. The Persian Abū al-Wafā’s textbook, *The Science of Arithmetic for Scribes and Businessmen* of about 976, which completely avoids Indo-Arabic decimal numerals, indicates that the eastern caliphate audience outside the sciences still rejected both sets of numerals. Russian historian M. I. Medovoy, who made a critical study of Abū al-Wafā’s text, asserts that in general the Arab east still preferred to write numbers as customary verbal expressions.³²⁹



Evolution of current numerals (Open University)

The transmission to the Latin West of the Indo-Arabic decimal numeration by position did not occur until the high Middle Ages. In the closing years of the tenth century, Gerbert, later Pope Sylvester II, and the monk Vigila of Albelda at the Monastery of Tipoll probably introduced Indian numerals to the West. In the twelfth century four translators into Latin of al-Khwārizmī’s *Arithmetic* and *Zij al-Sindhind* repeated the attempt with only a modest im-