



NUMBERS IN EARLY CIVILIZATION AND STAGES OF THEIR DEVELOPMENT

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Annotation: in the early days of civilization, fundamental changes occurred in mathematics, among all areas. In particular, for mathematicians, the numbers that are considered objects have also entered their stage of development. In Ancient Egypt and Mesopotamia, an early scientific-theoretical thought arose about mathematical thinking, about the first manifestations of numbers. In this article, thoughts on the stages of development, progress, significance in cultural life of mathematics, in particular numbers, were put forward in ancient (early) city-states.

Keywords: mathematics, number, ancient period, mathematical thinking, distribution of numbers, civilization, mathematical imagination

The further stages of development of mathematical thinking, the emergence and development of theoretical ideas in mathematics became associated with the emergence of the first schools of philosophy, which made the logical argument of the perception of the universe a priority. As a result, a number of scientific methods were developed, "mathematics has become a kind of universal language for the expression of these methods"¹.

Mathematical thinking, stages of development of mathematical representations are considered one of the complex social phenomena. F.Engels argues that "mathematics is not a product of pure imagination, but a product and means of studying the real world"².

In the linguistic consciousness, the increase in the amount of numbers in everyday life facilitated the calculation, trade relations between cities, states, more than ever. As a result, gradually a mathematical culture also began to form. According to M.F.Gilmullin "the mathematical culture of Russia and any other nation can be considered a natural phenomenon that is closely related to its social life"³.

It must be said that ancient Egypt is considered one of the cradles of mathematics. The early mathematical number system also appeared and formed here.

Most of the mathematical texts preserved in ancient Egyptian monuments are written on paper made from the base of the papyrus. But there are hardly any specific sources written about the mathematical knowledge of Ancient Egypt. Only the digital inscriptions and drawings on the stone columns and walls have survived, though. But although the details of scientific development are not known, in Ancient Egypt, A.D.in the 1st century BC. In the 3rd millennium, writing, where numbers existed, was considered one of the areas in which astronomy was much more developed, even during this period a calendar was developed. During this period, one of the seven world - famous miracles was erected, the Egyptian

pyramids. It must be said that the mathematical knowledge of the Egyptians can also be assessed according to the level of development of economics, technology and architecture.

The Egyptians used hieroglyphs to write numbers on stone or wood. Including 1- vertical line, 2 – two vertical lines, 10 – inverted letter u, 100-spiral, etc. (Images 1-2).

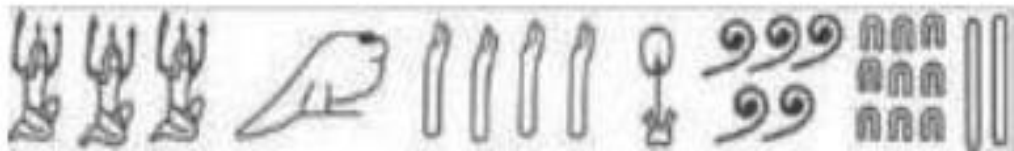


Image 1

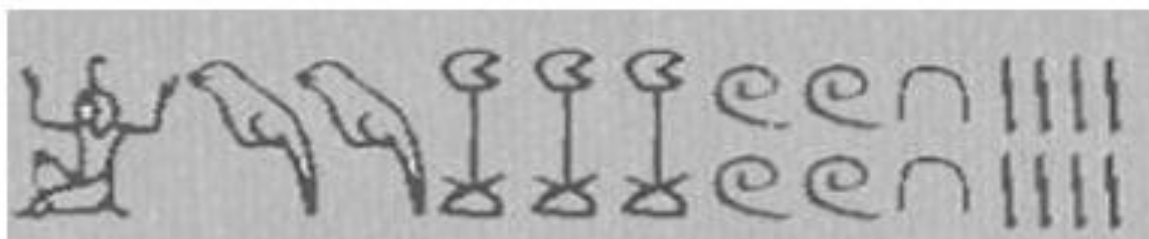


Image 2

Over time, mathematical thinking, mathematical culture also developed in the Egyptians. This was also reflected in the numbers: they began to use the system of writing mathematical numbers. Special signs were introduced to indicate the numbers. (Images 3-4)

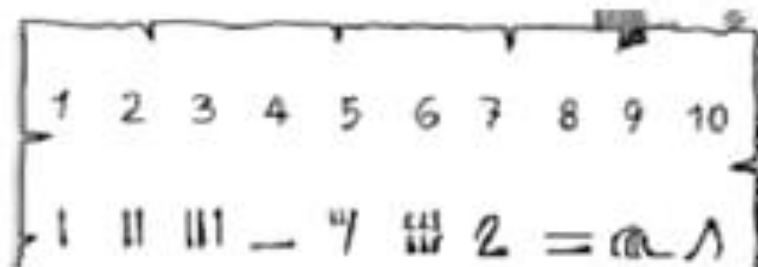


Image 3

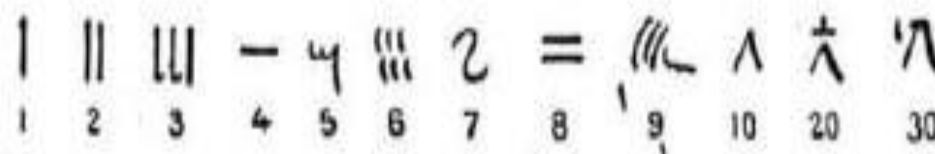


Image 4



Also, various archaeological excavations indicate that complex arithmetic calculations were carried out in Ancient Egypt.

The unit number system is a positional number system based on the integer base 10, and is one of the common systems. It has the so-called Arabic numerals 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 numbers are used. There are also opinions that say that the basis of this counting system depends on the number of human fingers.

In the second half of 3000 BC, a decimal nonpositional number system appeared in Ancient Egypt with a single encoding of decimal numbers.

“In another great civilization – Babylon in 2000 BC-a decimal number system was used with one encoding of decimal digits within small numerals”.

Gradually, a progressive mathematical culture began to take shape in other countries due to mutual trade exchange, cultural affinities. A much simpler number system was used in Mesopotamia, which was one of the foci of ancient civilization.

Over the millennia, the people of Mesopotamia developed agriculture, the nomadic lifestyle was replaced by a more sedentary lifestyle, and several city-states were formed: Babylon, Eridu, Lagash, Sumer, Ur. The early characters on clay tablets were pictograms that expressed the meaning of words in a simplified way. They were increasingly simplified, and as a result, leaving a limited number of wedge-shaped marks, they were pressed into the clay with a dry stick with a sharp flat tip, in which it was possible to obtain marks of different shapes by changing the angle of pressure. Later, it is known from history books that by 3000 BC the Sumerians had developed a complex script known as the cuneiform.

In Babylon, a system was used in which the value of each number depends on its position in the number. That is, there was a decimal positional number system. Only 2 characters were used in this: a knife in a flat vertical position denoting units and a knife in a lying gorizontal position representing Ten, which were very convenient counting methods for the Babylonians.

As stated above, the calculations were similar to the current one, as the number system in Mesopotamia was positional. They also used arithmetic operations such as subtraction, addition, multiplication, division. They even developed a special table for reproduction. But while such computations looked like a challenge for the current period of development, it was a tremendous achievement for the time. For example, to multiply 32 by 28, one had to first find and add $32 \cdot 20$ in the table and then $32 \cdot 8$.

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