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BASIC MATH CONCEPTS

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Abstract : The article gives the concept of the initial concepts of mathematics Like any science, mathematics has its own basic concepts with which it operates: set, number, counting, magnitude, form, etc. The initial content of most mathematical concepts are real objects and phenomena of the surrounding life and activities of people.
Keys words:set, elements, number, counting, magnitude, form, etc.

The basic concept in mathematics is the concept of set. A set is a collection of objects that are considered as a single whole. The world in which a person lives is represented by various sets: many stars in the sky, plants, animals around him, many different sounds, parts of his own body. A set is characterized by various properties, i.e. the set is defined by certain characteristics. These characteristics mean properties that are possessed by all objects belonging to a given set, and not possessed by any object that does not belong to it, i.e. this item is not an element of it. A set, unlike an indefinite multiplicity, has boundaries and can be characterized by a natural number. In this case, the number is considered to indicate the cardinality of the set.

At the beginning of the development of counting activity, comparison of sets is carried out element by element, one to one. The elements of a set are the objects that make up the set. These can be real objects (things, toys, drawings), as well as sounds, movements, numbers, etc. By comparing sets, a person not only reveals the equivalence of sets, but also the absence of one or another element in the set, one or another parts of it. There are two ways to determine the power of a set: the first is to count all its elements and call the result a number; the other is the identification of characterological features of the set.

Elements of a set can be not only individual objects, but also their collections. For example, when counting in pairs, threes, tens. In these cases, the elements of the set are not one object, but two, three, ten - a totality.

The main operations with sets are: union, intersection and subtraction.

The union (sum) of two sets is the third set, which includes all the elements of these sets. Moreover, the sum of sets does not always equal the sum of the numbers of elements of the sets. It is equal to the sum of the numbers of elements only when both sets have no common elements. If there are any, they are included in the amount only once. For example, in the riddle “Two fathers and two sons. How many are there in total?'" we see an example of combining sets when the sum of the elements is not equal to the sum of the numbers. Since the same person is included twice (in both the first and second sets), he is counted once. Or another example: in order to determine the number of disciplines that are studied by students of a pedagogical college in a semester, it is necessary to make a selection from the schedule of each day: to the set of subjects that students study on Monday, add not all the Lessons of the subsequent days of the week, but only those which were not named Monday. Thus, the number of subjects will be less than the total number of lessons per week, since there are subjects repeated on different days.

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When we subtract two sets, we get a third set called the difference. The difference includes elements of the first set that do not belong to the second. In Figure 3, the shaded part is the difference between the two sets.

When characterizing sets, mathematics uses the following concepts: finite and infinite sets, equal and unequal, one- and two-element, empty set, part of a set, or subset. Children of early and preschool age become acquainted only with finite ones, i.e. having boundaries, sets.

Counting is the first and main mathematical activity based on element-by-element comparison of finite sets. In characterizing this concept, first of all, it should be emphasized that this is the establishment of a one-to-one correspondence between two sets. In the history of human development, pre-numerical counting has been used for a long time. A person compared sets, stated their equal number (equality) or not equal number (the same, less, more...).

With the advent of natural numbers, people began to use the number series as one of the sets.

A number is an indicator of the power of a discontinuous (set) or continuous value. The number is always the ratio of this quantity to the chosen measure, therefore the number is not a constant characteristic, it is relative to the unit that is taken as the measure (you can count in pairs, tens; you can measure with different measures - the result will be different).

The concept of quantity in mathematics is considered as fundamental. It arose in ancient times and throughout the history of the development of society was subjected to a number of generalizations and specifications. Magnitude is length, volume, speed, mass, number, etc. In this case, we narrow the concept of “size” and will characterize only the size of objects with it.

The size of an object is its relative characteristic, emphasizing the extent of individual parts and determining its place among homogeneous ones. Magnitude is a property of an object, perceived by various analyzers: visual, tactile and motor. In this case, most often the size of an object is perceived simultaneously by several analyzers: visual-motor, tactile, motor, etc.

The size of the object, i.e. The size of the item is determined only on the basis of comparison. It is impossible to say whether an object is large or small, it can only be compared with another. The perception of size depends on the distance from which the object is perceived, as well as on the size of the object with which it is compared (Fig. 4). The further an object is from the one who perceives it, the smaller it appears, and vice versa, the closer it is, the larger it appears.

The size of an object also depends on its location in space. The same object can be characterized either as tall (low) or as long (short). It depends on whether it is in a horizontal or vertical position. So, in Figure 5, and the objects are located in a vertical position and are characterized as tall and short, and in Figure 5, 6 these same objects are characterized as long and short.

The size of an object is always relative, it depends on what object it is compared with. When comparing an object with a smaller one, we characterize it as larger, and when comparing the same object with a larger one, we call it smaller. This situation is presented in Figure 6.

So, the size of a specific object is characterized by the following features: comparability, variability and relativity.

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The size of an object is determined by a person only in comparison with another value - a measure. A measure is a standard of magnitude. Our ideas about the relationships between objects act as standards of size and are designated by words indicating the place of the object among others (large, small, tall, long, short, thick, thin, etc.).

The initial identification of a value and the emergence of elementary ideas about it are facilitated by objective actions, including various types of direct comparison of objects with each other according to their size (overlaying, attaching, attaching), as well as indirect comparison using measurement. Measurement is one of the types of mathematical activities. Using measurement, a continuous quantity is determined: mass, volume, extent. In the history of the development of human society, counting and measurement were, of course, the very first types of mathematical activities, closely related to the basic needs of man, and above all with the determination of land areas, the capacity of vessels, etc.

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