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METHODOLOGY FOR FORMING REPRESENTATIONS ABOUT RELATIONS BETWEEN GEOMETRIC FIGURES

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ABSTRACT:

The article discusses the methodology for the formation of ideas about the relationship between geometric figures in teaching elementary school students to the elements of geometry and the formation of elementary ideas about space in mathematics.

KEYWORDS: Spatial, relation, figure, concept, geometry, exercise, elements, knowledge, analysis, formation.

INTRODUCTION:

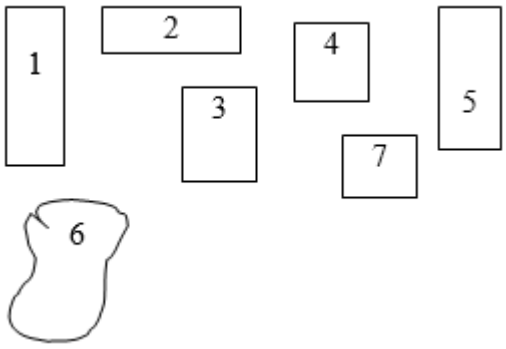
Let us consider the methodological provisions for the formation of ideas about individual relations, depending on how geometric objects are perceived.

When schoolchildren operate with object models of figures, they perceive their form as something inseparable from the models and therefore are able to establish relations between them that do not require an internal analysis of these objects. This is, for example, the relationship expressed by the terms “left”, “right”, “above”, “above”, “below”, “on one side”, etc.

For their assimilation, it is important for students to understand a fixed object. When studying the relations expressed by the words “above” and “below”, it turned out that schoolchildren tend to understand them as the arrangement of objects on a sheet of paper relative to the upper and lower edges and as an arrangement in three-dimensional space. But even with such a perception of geometric objects, it is already possible to acquaint students with the relation of belonging. In this case, it is necessary to work out such aspects of the concept being formed as: the selection of an object from a set, elements in a figure, a specific figure from a complex configuration and an understanding of the belonging of an element to a figure, the inclusion of one figure in another.

When the task is to isolate an object from a given population, then the attribute by which it is selected is known to the students. In each specific case, it is necessary to correlate it with some object from this set. The technique of concretization is clearly used here. Schoolchildren learn that depending on which feature is set, it is possible to select or not select a figure, and the same figure can be selected as a figure that satisfies several features.

Example # 1. Examine drawing (1). From the given set of figures, select all the quadrangles and give their numbers; select the squares in the given set and give their numbers. What figures did you name in both cases?

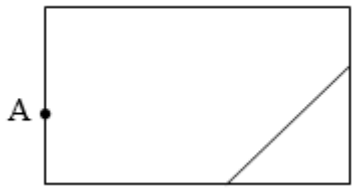


1-Examine drawing.

Which figure was mentioned for completing all the tasks? (Such work on the assignment can be organized in the fourth quarter of the first and second grades).

The list of relations considered in this case is somewhat expanded, since children can already select the elements of the shapes (vertices, sides, corners) and establish the relationship between the element and the figure, the relationship between the elements of the figure.

Example # 2. Consider drawing (2). Find and shade the triangles. Add letters to the shape and write out all the segments. Find and separately write down the vertices of the rectangle and the vertices of the triangle.



2- Consider drawing.

When establishing the belonging of a geometric object to another or some set, it is necessary to correlate it according to the selected property with the considered set or other object. The predicates expressing this relation look like this: "X is an element of Y", "X belongs to Y", "Y passes through X", etc. For example, on a specific material in this case: “t. And belongs to the side of the rectangle."

At the same time, it is important to bring children to the understanding of the term "belongs" itself. To do this, first, the sets of models of figures or their drawings are considered and it is determined whether the specified object is included in the specified set.

Example No. 3. Consider the figures shown in Figure 3 (or displayed on the typesetting canvas):

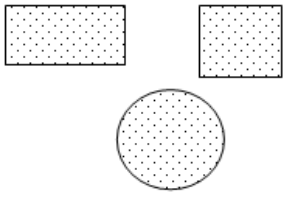


Figure 3

Is there a square in this set b) a triangle c) is there a circle among these figures (Yes).

The students are told that in such cases all these questions can be formulated using the word "belongs". For example, a) does the circle belong to this set (Yes); b) what other figures belong to the considered population (Rectangle; square).

When students learn to understand some verbal and semantic connections, it is important to offer assignments of such a type:

Example No. 4. Let there be a set of figures in which:

all corners are straight; b) opposite sides are equal. Could this be true for a square? (Yes).

In this case, the square is said to belong to this population. Do such figures belong to the set under consideration? (fig. 4). (Similar tasks can be performed in grade 3).

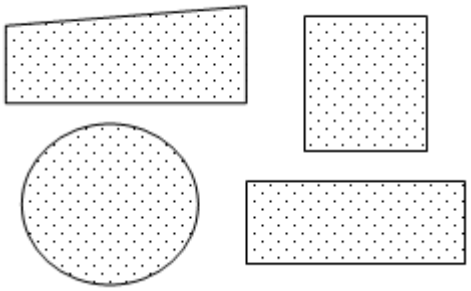
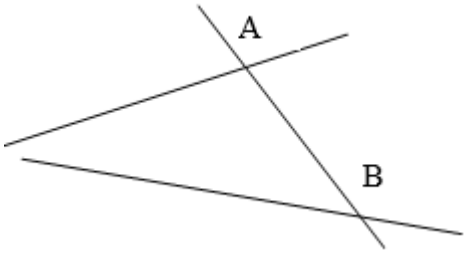


Figure-4

When studying elements of geometry in elementary grades, students are faced with limited and unrestricted shapes. Therefore, when establishing a membership relationship, it is important to direct the work towards using the internal points of bounded figures that are not indicated in the drawing, and also to consider points that do not belong to the figure.

Example No. 5. Examine drawing (5). Do points A and B belong to the corner? Show where you can mark two more points of the straight line, different from points A and B, which also belong to the corner? What is part of the straight line completely included in the corner?

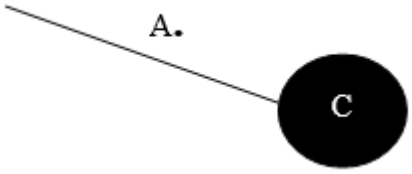


5- Examine drawing .

By answering the last question, students can say that all points of the line segment AB belong to the corner.

Example # 6. Consider drawing (6). Name the point that lies inside the circle, name the point that lies outside the circle.

Find and mark a point that belongs to both the circle and the line. If schoolchildren find it difficult to complete the last point of the assignment, then you can ask them to find a point on a straight line that is 2 cm to the right from point A (this way, students will be able to remember that the drawn part of the straight line can be continued).



6- Consider drawing

Find and mark a point that belongs to both the circle and the line. If schoolchildren find it difficult to complete the last point of the assignment, then you can ask them to find a point on a straight line that is 2 cm to the right from point A (this way, students will be able to remember that the drawn part of the straight line can be continued).

When assimilating the content of the concept, it was important not only to establish relationships by examining the drawings, but also to draw figures in the indicated relationship.

Example No. 7. Draw a line segment and a square so that one point of the line segment belongs to the square. Draw the shapes so that each point of the line segment belongs to a square.

As a result of performing similar exercises, students realize that a separate isolated object belongs to the totality, that points that lie on the contour of a figure or belong to its inner region belong to the figure in question and have properties characteristic of this figure. They can be identified verbally, fixed in the notation.

Starting from the 2nd grade, it is advisable to consider tasks for combining figures, because schoolchildren have the opportunity to observe the receipt of a new figure, and, therefore, to record the inclusion of others in it.

Example No. 8. From a set of didactic material, select two rectangles with one equal side. Having placed them on the desk, attach them to each other with equal sides so that a new figure is obtained. What shape did you get by combining the data? (Rectangle). What are the shapes of the rectangle? (From two rectangles). How many rectangles can you find on the model? (Three: two components, and the third was obtained by combining two components). Thus, two constituents are included in the third. (Tasks of this nature are already feasible for 1st grade students). In this case, it was necessary to propose not only to find and fix objects that belong to a certain set or are included in another object, but also indicate the object to which the fixed point belongs, which includes another object.

By examining the relationship between geometric shapes, students learn that there are points that belong not to one but to several shapes. They are called common points. Some figure may be common. In such cases, the original shapes are said to intersect.

For example, when considering Figure 7, students should be drawn to the fact that the segments AB, DB and CB have a common point B, and therefore they intersect at this point.

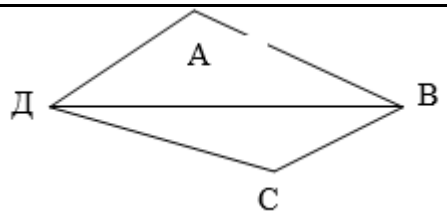


Figure 7

Operating with drawings, students, basically, correctly find the common part of the border of two figures. If the common part is any other figure, then it is sometimes not noticed and the intersection of the figures is set as the intersection of the contours. Children often find it difficult to establish the intersection of limited and unrestricted shapes (for example, a circle and a straight line). At the same time, students should be introduced to the idea of the presence of common points at the intersection, i.e., that these points belong to both one and another object. When assimilating order relations, it is important that schoolchildren understand the presence of points, reference, preceding, subsequent elements, and understand that according to certain properties of objects, some of their totality can be ordered.

For the formation of ideas about the relations of order, the following tasks were solved: according to the indicated relation, to order the totality of objects; considering the totality, to establish the relationship according to which the ordering is performed; in a number of objects to establish relationships expressed by the terms "to the left of", "follows", "precedes", etc .; find elements, the position of which is characterized as follows: "every second", "lies between", etc. However, as it turned out in the course of the experiment, the solution of these problems required the students to understand the direction in a row both for building it according to a given ratio and for establishing relationships in a certain set of objects arranged in a row. The directions were usually set relative to the sides of the body. If we were talking about a finite set of objects, then when establishing order relations it was necessary to understand such terms as “every”, “every third”, “all”, etc. Therefore, tasks of this type were solved first of all.

When students operate with drawings, the circle of relations under consideration expands, since elements of the figures are already used to establish correspondence. The study showed that first grade students learn with some difficulty that several objects can correspond to one object, at the same time, quite consciously, several objects can be correlated with one. It is more expedient to consider an unambiguous correspondence first on discrete sets of figures. In this case, it is easier for schoolchildren to learn both the comparison of one object to another, and the fact that one object corresponds to one and only one.

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