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Research Article

DEVELOPING STUDENTS' CREATIVE AND SPATIAL IMAGINATION ABILITY

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ABSTRACT

The article is devoted to the methodology of selecting issues related to the creativity and spatial thinking component from the components that develop mathematical abilities in order to develop students' mathematical abilities, examples are given.

KEYWORDS

Ability, mathematical ability, development, component, thinking, creative, spatial imagination.

INTRODUCTION

In our country, great attention is paid to the creation of social, psychological, pedagogical and methodical conditions for the development of student's mathematical abilities. Because the mathematical training of young people is of particular importance in restoring the intellectual, creative and spiritual potential of our country, which implies not only the formation of mathematical knowledge, skills and abilities, but also the development of students' mathematical abilities[1,2,11-18].

According to psychologists, "ability is a person's personal potential and capabilities, which is sharply different from knowledge, because knowledge is the result of reading. Ability is a characteristic of a person's psychological and physiological structure. Ability differs from skills and competences and improves in the process of acquisition of skills and competences by a person" [3]. Therefore, any ability consists of a complex psychological concept of a person, which includes a system of characteristics proportional to the requirements of the activity. Therefore, ability should be understood not as a single feature, but as a synthesis of features that can meet the requirements of a person's activity and provide an opportunity to achieve high performance in this activity. Basic

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characteristics for all abilities are formed on the basis of observational skills, that is, the ability to understand a person, to be able to see one or another symptom from an object, and to distinguish.

Table 1.1.

Description of mathematical abilities in the view of scientists

T/p	Scientists who have studied mathematical abilities	Description of mathematical abilities in the view of scientists
1.	V.A.Kruteskiy	Mathematical ability - the ability to summarize material from mathematics, to make logical reasoning in a sequence, correctly distributed, to reduce the reasoning process, to think in a concentrated systematic way.
2.	D.Gilford	Mathematical ability - reflecting the methods and characteristics of mental activity, knowledge, memory, effective thinking and the ability to correctly assess situations process.
3.	M.G.Davletshin	Mathematical ability consists of a complex psychological concept of a person, which includes a system of characteristics proportional to the requirements of the activity.
4.	S.L.Rubinshteyn	Mathematical ability is a feature that appears during socio-historical development and can make a person capable of successfully carrying out socially useful activities.
5.	B.T.Teplov	Mathematical ability is an individual-psychological characteristic that distinguishes a person from another, and these characteristics cannot be transferred to knowledge, skills and qualifications.
7.	A.N.Kolmogorov	Different aspects of mathematical ability occur in different combinations, and these abilities often appear very early and require constant training.
8.	E.S.Kanin	Mathematical ability is the study of individual psychological characteristics in human activity and the development of creative mathematics.

As we can see from the table, V.A. Krutetsky in his scientific research has the ability to generalize mathematical material, sequential, correctly distributed logical reasoning, shorten the reasoning process, concentrated systematic thinking, the ability to switch from the correct thinking process to thinking in the opposite direction, he listed abilities divided into 9 groups, such as ability to switch from one mental

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activity to another, mathematical memory, spatial imagination [3]. When solving geometric problems, especially spatial geometric problems, it is not possible to clearly show different sections in a drawing, in such cases it is necessary to be able to mentally imagine the resulting section. It is difficult to draw a diagram of a geometric problem and start solving it without imagining it. Therefore, the ability to nonverbal imagination is an important component of mathematical ability.

Creativity: solving a problem through a non-standard approach to finding a solution to a given situation. Self-confidence is a system of conscious and unique ideas of a person, on the basis of which he shows his behavior and character. Self-confidence includes all positive qualities that begin with the word "self" such as self-esteem, self-esteem, self-awareness, self-esteem. It also includes the factor of understanding one's place among people, which is the most important factor of personality formation. One of the important characteristics of the student's development during the school period is the predominance of emotions, which form the basis of self-confidence. That is, self-confidence in lower classes is mainly unconscious, while in higher classes the weight of conscious self-confidence increases [4-10].

In the development of creative ability, it is appropriate to apply issues of this type [8]:

Matter. a) Solve the equation $(x^2-2018^2)^2-8072x-1=0.$

Solution. In order to simplify the equation $a=2018$ we define as , then $8072=4a$ and the given equation becomes: $x^4-2x^2a^2+a^4=4ax+1.$ Moreover, the creative ability of the student makes the equation look simpler.

That is, *equation* $(x^2+a^2)^2=4ax+1+4a^2x^2=(2ax+1)^2$ takes the form This leads to the following two equations: $1)\,x^2+a^2=2ax+1;\quad 2)x^2+a^2=-(2ax+1).$ The second of the equations has no real solutions because it $x^2+2ax+a^2+1=0$ into the equation and hence $(x+a)^2+1=0$ as strong as This equation has no real solution. From the first:

$(x-a)^2=1,$ ie $x=a\pm1.$

Hence, the reader achieves his goal by introducing a notation into the equation in finding a solution and finds that the given equation has two solutions: $x_1=2017,\ x_2=2019.$

Equations of this form, or equations or expressions involving year dates, and introducing markings to simplify the expression, ensure that students reach the goal in finding a solution and develop their creative ability.

b) Calculate the value of the expression: $(1+2+2^2)(1+2^3+2^6)(1+2^9+2^{18})(1+2^{27}+2^{54}).$

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Although problems of this type seem difficult in form, the student tries to find a new way to find a solution and increases his confidence. So, counting, simplifying and shortening consecutive expressions develops students' creative abilities.

Solving. The student is solving the problem $(1+2+2^2)$ Realizing that the expression is part of a short multiplication formula, multiplying by taking into account that the expressions in parentheses are all positive, the given expression $(2^3-1)(1+2^3+2^6)(1+2^9+2^{18})(1+2^{27}+2^{54})$ appears. From this $(2^3-1)(1+2^3+2^6)=2^9-1$ taking into account that the given expression $(2^9-1)(1+2^9+2^{18})(1+2^{27}+2^{54})$ makes it look like it is. Then, doing the same with the remaining multipliers of the expression increases his confidence and solves the problem, resulting in $x=2^{81}-1$ will answer.

Spatial imagination - the ability to spatial, that is, non-verbal imagination, is the ability to understand and mentally imagine mathematical objects or events, their various sections, size, shape, plane, relative location and movement in space. For the development of spatial imagination, it is appropriate to use problems of this type [5].

Matter. The sides of the base of a right-angled parallelepiped are 7 cm and 24 cm. The height of the parallelepiped is 8 cm. Find the area of the diagonal section.

Solving. When solving this spatial problem, the reader imagines the drawing of a parallelepiped in the following form (Fig. 1).

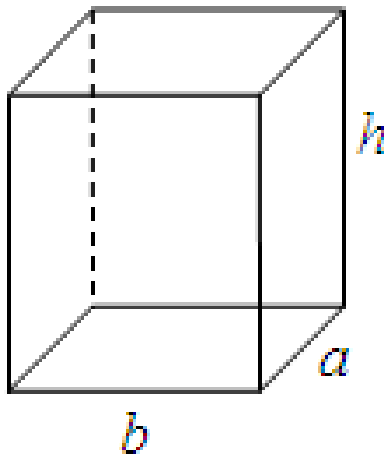

Fig 1.

In this case, according to the condition, the diagonal section of the parallelepiped is drawn as in Fig. 2 and

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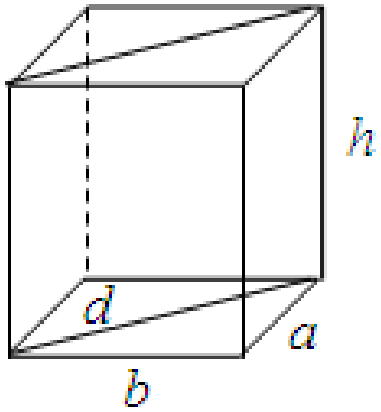

Fig 2.to find the surface area of the diagonal section, trace the diameter of the base of the parallelepiped as follows. It is known that the sides of the base of a parallelepiped a=7 sm, b=24 cm height h=8 is equal to cm. Therefore, the face of the diagonal section of the parallelepiped is found as follows So, this issue develops the student's spatial imagination.

Solving the problems of developing students' mathematical abilities is related to taking into account social, psychological-pedagogical and methodical aspects. The social aspect of the problem calls for increased attention to the education of gifted and talented children and the need to develop their mathematical abilities to the maximum.

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