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Formation of Concepts of the Coordinate System in Primary School Students

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Abstract
This article describes the concepts of the coordinate system, their content in the program and textbooks on mathematics for elementary school, as well as the methods for forming the initial ideas about the subject in younger students.

Keywords: elementary class, program, textbook, analytical geometry, Cartesian coordinate system, coordinate angle, horizontal and vertical lines, point coordinate, coordinate grid.

Introduction

In our republic, the most important link in the process of reforming and renewing society is the policy of reforming the education sector as a necessary and mandatory condition for democratic changes in society, sustainable development of the economy, and integration of the state into the world community. Today, the National Curriculum, which is being created for the continuous education system, is the only educational system that covers the entire process of teaching and educating the young generation, and each part of this system has a special place and importance. .

In the requirements of the state nationwide program for the development of school education of the national curriculum, "the formation of the educational process, the determination of the educational content, the development of didactic laws and principles of the implementation of the educational process, the improvement of the state educational standards, it was emphasized to solve the task of creating educational programs, a new generation of textbooks, educational-methodical complexes.

Methodological problems arise in every lesson, however, they usually do not have a one-size-fits-all solution. In order for the teacher to be able to quickly find the most suitable solution to the methodological problem that arose in the lesson for this educational situation, it is necessary to have a wide enough training in this field. Methodological excellence of the teacher, knowledge of science and technology innovations and their implementation in lessons, and the

process of delivering them to students on time are among the most urgent tasks today, and the development of the young generation as a mature and well-rounded person, the state and society It is of great importance to be able to make a worthy contribution to the development, to be able to consciously and independently respond to the events happening around us, in our country, and in the world.

It is necessary to emphasize that mathematics, along with all other subjects, has a special place in the education of the young generation as a well-rounded mature person. Analytical reasoning, logical observation, spatial imagination, abstract thinking are necessary abilities for all spheres of human activity, which are formed and deepened in the process of learning mathematics.

As a result of comparing all the sciences that shape human thinking, it can be concluded that mathematics does not study material objects, but properties related to the structure of the investigated objects and research methods. Currently, the first source for most problems, concepts, and theories in mathematics is real phenomena and processes. For example, arithmetic and number theory were initially formed from a practical problem - counting objects, geometry - a source of solving problems related to comparing distances, measuring the surface of flat figures or the volume of spatial bodies, etc.

So, in ancient times, arithmetic and geometry constituted the whole of mathematics. All mathematics was both theoretical and practical, as both of them had many applications in commerce, measurement of surface and volume, and navigation of ships.

Perfect teaching of school mathematics, especially geometrical material starting from primary grades (1-4 grades) plays an important role in the performance of the above-mentioned tasks. Therefore, in the National Curriculum, topics related to geometry can be separated as a separate chapter, the topics are given in a spiral way from simple to complex in the section of classes, and practical work and project work can be seen in their content.

In the mathematics curriculum of primary education, geometrical material serves the purpose of introducing children to the simplest geometric shapes, developing their spatial imagination, as well as demonstrating arithmetical laws and connections. (For example, the representation of a rectangle divided into equal squares is used to reveal the permutation property of multiplication...).

Starting from the 1st grade, points, straight and curved lines, sections, rays, polygons and their elements, right angles and simple spatial forms are introduced. Students should learn to visualize geometric shapes, name them, and make simple drawings on grid paper. In addition, it is assumed that they will acquire the ability to find the length of the cross section and broken line, the perimeter of a polygon, a rectangle, a square, and the face of any shape (with the help of a palette).

It is important to dwell on the contemporary importance of the coordinate system as a practical application of geometry. There is a person who definitely uses various coordinates, places, and landmarks in the process of traveling, now finding and determining the exact address is not a problem. Who, except specialists, can imagine that geometric concepts and knowledge lie at the root of such possibilities, that the method of coordinates is related to analytical geometry, which is calculated from important branches of mathematics?

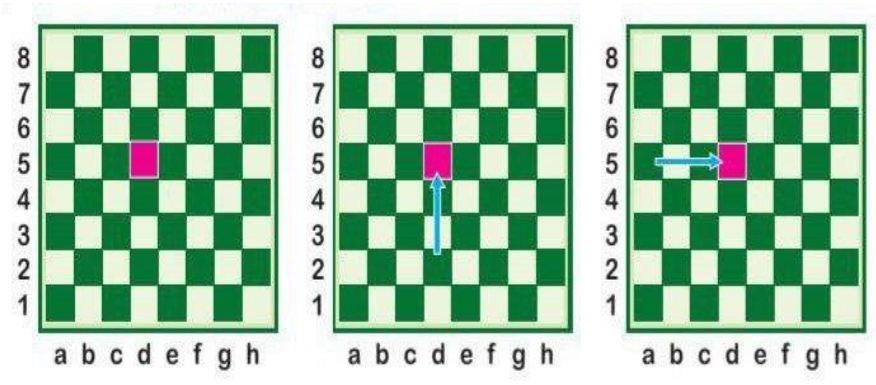
Therefore, inculcating the importance of each subject applied in our daily life into the minds of students, introducing them to their content, and showing them as evidence serves to form practical (spiritual) competencies in them.

In analytical geometry, simple geometric figures (points, straight lines, planes, second-order curves and surfaces) are studied by algebraic tools based on the method of coordinates. Analytic geometry is used in physics and engineering, as well as in aviation, rocketry, space science, and space flight. It is the foundation of most modern branches of geometry, including algebraic, differential, discrete, and computational geometry.

Analytical geometry, as reflected in school textbooks, can be explained more simply: it is studied in relation to the numerical identification and representation of geometric shapes and the extraction of numerical information from numerical definitions and representations of shapes. The basis of learning methods in the course of analytical geometry is the method of coordinates, and the main idea of this method was fully described for the first time in the book "Geometry" (1637) by the French scientist René Descartes.

Based on our goal, we will focus on the analysis of the topics related to the coordinate system given in the elementary school mathematics textbooks (2021y) created on the basis of the National Curriculum. The formation of initial ideas about the coordinate system begins in the 2nd grade.

The 2nd grade mathematics textbook consists of 8 chapters, and the introduction of basic concepts about coordinates is reflected in the topic "Problems about tables" (Chapter 8, lesson 5, page 169) and the topic "Coordinate - determination of location" is included from the next lesson (7 - lesson, page 171). In this topic, the chessboard is presented as a table, and the first concepts about its rows and columns are given. Finding squares a1, d5, h8, g4 from the chessboard in the task "Solving problems related to the table" is given in the following form on the basis of indicativeness:



In this case, it is necessary to pay attention to the fact that students pay attention to the letters in the row first, then to the numbers in the column, and to find the boxes or letters and numbers corresponding to the boxes in this order. In fact, in the game of chess, the movements of the pieces are determined in this order. This order allows the students to determine the coordinates of the point located in the coordinate system first by taking the numbers located on the OX - horizontal axis, and then on the OY - vertical axis and writing them in the form of (x; y) comes

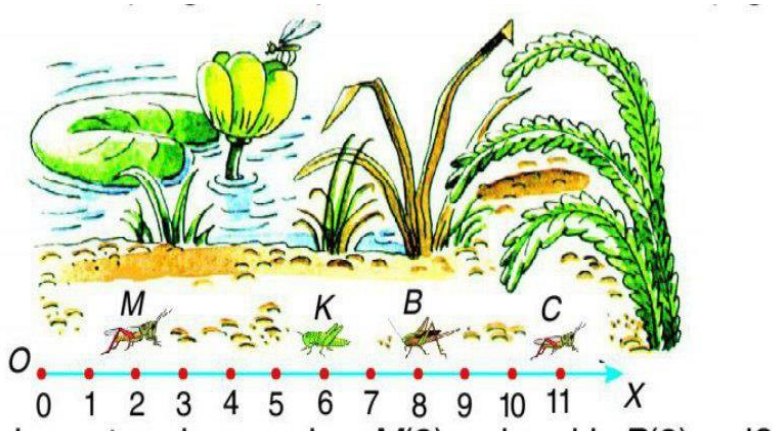
to hand and avoids the gap, a mistake made by a large number of students in this regard. In the topic "Coordinate - locating", brief information about coordinates was given, and the tasks revealed the essence of the topic with real examples, such as determining the location of the row and seat indicated on the concert ticket, and finding the location of the animals on the seats for the audience in the theater hall.

Through such tasks, the student learns to find his place in a concert ticket, first to find a row, and then to sit, and life skills are formed in them.

In the 3rd grade mathematics textbook (2022), tasks related to the coordinate system are given in the topic "Coordinate angle" of the chapter "Working with data" (Chapter 8, lesson 3, page 155). Students' ideas about coordinates in the 2nd grade were gradually transferred to mathematical language in the 3rd grade. In particular, the concepts were given that the lines they called rows and columns are now called x - horizontal and y - vertical. In the 3rd grade textbook, more than 20 tasks are given about the coordinate angle. The contents of these tasks are varied and range from simple to complex, and students develop the ability to work with coordinates, and begin to understand how important their role is in our daily life. For example, through the following task, students find the coordinates of the addresses highlighted in red based on the sample and mark them with the corresponding numbers (Chapter 8, Lesson 5, page 158)

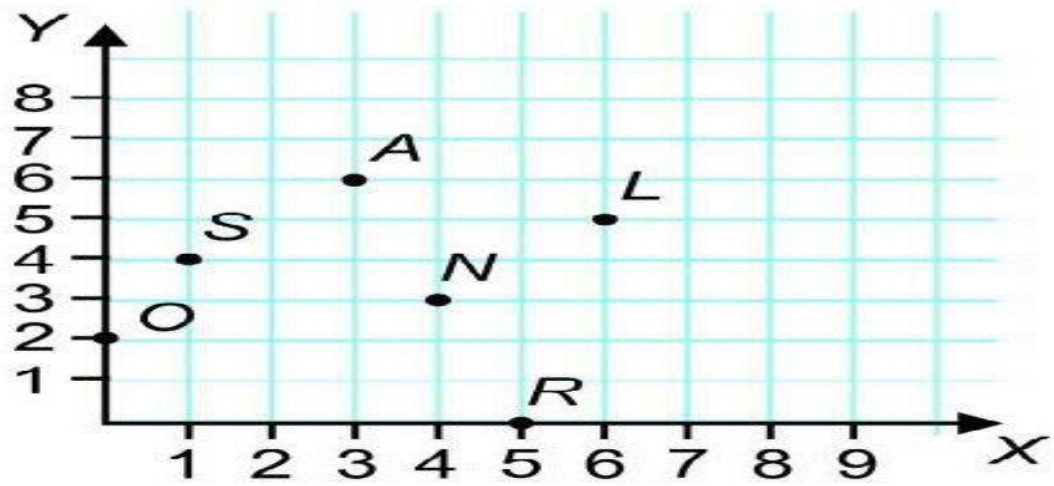
The assignment describes a topographical map of the city, where the university, hospital, and international airport are marked in red. By finding the coordinates of these points, students develop skills and thinking skills such as accuracy, thoroughness, comparison, estimation, and the ability to find the corner of the coordinates where the place is located. In today's advanced age of science and technology, every student has a mobile device with location-finding programs installed, through which students can easily find their destination.

In the 4th grade textbook (2020), concepts and information about coordinates are given in the chapter "Building a coordinate grid. Spatial forms". The first topic in it is related to the coordinates of the point, and through the given tasks, the students' initial ideas are further strengthened and enriched with new knowledge.



In this task, the place where the locusts land is represented by the points on the coordinate axes, and identifying it and labeling it with letters and corresponding numbers allows students to get more interesting information about coordinates and, most importantly, to explain them in a fun way that is suitable for children.

The next topic is the coordinate angle, in which more detailed information is given about the coordinate angle corresponding to the 1st quarter in the coordinate system, determining the coordinates of the points in it, and writing it down..



In this case, the point O (coordinate head) is selected, and mutually perpendicular (crossed at right angles) axes are drawn from it. They are called coordinate axes, and the notion that OX

is the horizontal axis and OY is the vertical axis and corresponding tasks are given to them. Also, 4th grade students perform tasks such as creating and making different shapes (triangle, rectangle, square, etc.) using the coordinate grid using the coordinates of the given ends. Such tasks serve to develop students' life skills by finding the coordinates of different places and how to act by connecting them, and by completing project work such as creating a map of their mutual location.

In conclusion, we can say that explaining the above-mentioned concepts and information about the coordinate system to students in a simple and practical way from the elementary school will help them learn the topics of the coordinate system more easily when they move to higher classes. On the basis of completing tasks related to everyday life, students conclude that mathematical knowledge is not just knowledge to be mastered, but must be mastered as a vital necessity.

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