

# COMPARISON OF THE TEACHING CURRICULUM IN MATHEMATICS BETWEEN MONTENEGRO, SERBIA, BOSNIA AND HERZEGOVINA, AND CROATIA IN VI (VII) GRADE OF PRIMARY SCHOOL

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## ABSTRACT

The aim of this research is to compare the basic goals and tasks, learning outcomes or contents/concepts, and mathematical curriculum for VI (VII) primary schools used in Montenegro, Serbia, Bosnia and Herzegovina, and Croatia. Mathematical curriculum for Montenegro of Serbia, Bosnia and Herzegovina, and Croatia is relatively analyzed in the following research work: (a) Mathematical curriculum of Montenegro used for VII grade of primary school, (b) Mathematical curriculum of Serbia which is used for VI grade of primary school, (c) Mathematical curriculum of Bosnia and Herzegovina used for VII grade of primary school, and (d) Mathematical curriculum of Croatia used VI grade of primary school. The collected data were analyzed relatively using document analysis as a qualitative method of analysis.

**Keywords:** Comparative education, Mathematical curriculum for primary schools, Mathematical education.

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## INTRODUCTION

The need for the highest quality education system is one of the main priorities and goals of every successful state. Montenegro, Serbia, and Bosnia and Herzegovina are countries that aspire to the European Union, so all laws are directed towards that path. We are witnesses that the education system is working to create conditions that will be somewhat similar to the European Union as adequately and qualitatively as possible. While Croatia is a country that has been part of the European Union for several years, and which is at the level of developed countries in terms of the education system, it is an incentive to compare it as part of research work. To this end, studies on the comparative study of education systems, educational policies, and practices of different countries are called comparative studies of education.

## PURPOSE AND SIGNIFICANCE OF RESEARCH

This research paper was performed to compare the similarities and differences in the curricula of primary education in Montenegro, Serbia, Bosnia and Herzegovina, and Croatia in relation to the basic goals and tasks as well as the learning outcomes or contents. Curriculum research is applied today in different countries and has an important place in comparative studies of education for the highest quality education, which is necessary today, where the existence of advanced technology, desire, and reason for learning is decreasing. Therefore, there are bigger problems in achieving that goal.

## METHODS

This study is a national survey of comparative education. This study compares the content of mathematics lessons with respect to the secondary level of selected countries and the purpose of applied mathematics education programs. This is the most commonly used method of comparing the researchers' own country with other countries. In short, comparative research is the investigation and comparison of existing differences for analysis. This study is a qualitative study and the research model is a screening model. Research sample: In the research, the mathematical curriculum of Montenegro is applied for the 7<sup>th</sup> grade of primary school (model of nine-year primary education harmonized with European education), in Serbia the mathematical curriculum is applied for the 6<sup>th</sup> grade of primary school, in Bosnia and Herzegovina

the mathematical curriculum and the program is applied for the seventh grade of primary school (the model of nine-year primary education harmonized with the European school system), while in Croatia the mathematical curriculum is the sixth grade of primary school. As the results are of a regional character, we were encouraged to choose this topic by the fact that all the above-mentioned Republics were part of the FRY, so we came up with the idea to compare these four mathematical curricula. The fact is that all the above-mentioned Republics, with their efforts and pilot projects, are trying to introduce the educational system of their Republic in the best possible way.

## Data collection and data analysis

Information on the mathematics curriculum and their educational status is obtained from the curriculum guidelines on the official websites of the countries: Montenegro (<http://www.zzs.gov.me/naslovna/programi/osnovno>), Serbia (<http://osnovneskole.edukacija.rs/materijali-za-nastavnike>), Bosnia and Herzegovina ([http://www.sobih.ba/siteoo/images/stories/galerije/Zakonska\\_akta/okvini%20npp.pdf](http://www.sobih.ba/siteoo/images/stories/galerije/Zakonska_akta/okvini%20npp.pdf)), Croatia ([http://www.azoo.hr/index.php?option=com\\_content&id=5867:nastavni-plan-i-program-za-osnovnu-kolu-hnos-i-ostali-programi-&Itemid=631](http://www.azoo.hr/index.php?option=com_content&id=5867:nastavni-plan-i-program-za-osnovnu-kolu-hnos-i-ostali-programi-&Itemid=631)) [http://www.azoo.hr/images/AZOO/Ravnatelj/RM/Nastavni\\_plan\\_i\\_program\\_za\\_osnovnu\\_skolu\\_-MZOS\\_2006\\_.pdf](http://www.azoo.hr/images/AZOO/Ravnatelj/RM/Nastavni_plan_i_program_za_osnovnu_skolu_-MZOS_2006_.pdf) [https://mzo.hr/sites/default/files/migrated/nastavni\\_plan\\_i\\_program\\_za\\_os\\_2013.pdf](https://mzo.hr/sites/default/files/migrated/nastavni_plan_i_program_za_os_2013.pdf) The basic goals and tasks, the subject of distribution and evaluation of mathematical programs of selected countries were examined, and the obtained data were analyzed by a qualitative method of document analysis. The results presented in the form of a table are relatively interpreted and the research results are established.

## RESULTS

In this part, there is data obtained from the point of view of basic goals and tasks as well as curricula in Montenegro, Serbia, Bosnia and Herzegovina, and Croatia for primary schools by learning outcomes or content.

According to Table 1, it is stated that the basic goals of teaching mathematics in Montenegro are achieved through the realization and achievement of cognitive and process goals. Cognitive goals include the knowledge that the student will acquire through the adoption of

**Table 1: Basic goals of teaching mathematics in Montenegro, Serbia, Bosnia and Herzegovina and Croatia**

Montenegro	Serbia	Bosnia and Herzegovina	Croatia
<p>The goals of teaching mathematics are achieved through the realization and achievement of cognitive and process goals. Cognitive goals include the knowledge that the student will acquire through the adoption of mathematical content given in the programs, Process goals include skills and values that are developed during and in the learning process. Through cognitive goals, students should:</p> <ul style="list-style-type: none"> <li>-acquire mathematical knowledge that forms the basis of modern general education;</li> <li>-acquire the mathematical knowledge they need for further education;</li> <li>-acquire basic knowledge: about sets, from algebra, geometry, combinatorics, probability, statistics and theory of arrays and functions;</li> <li>- master the technique of calculation;</li> <li>-understand mathematical rules and statements;</li> <li>- adopt mathematical symbolism;</li> <li>-understand mathematical language;</li> <li>-master the techniques of mathematical modeling in solving textual problems.</li> </ul> <p>Through process goals, students should develop:</p> <ul style="list-style-type: none"> <li>-ability to think logically, reason and generalize and mathematically proving;</li> <li>-professional skills and abilities;</li> <li>-ability to solve problems;</li> <li>- skills of interpretation of data presented in diagrams, tables or graphs different types;</li> <li>-skill of using geometric accessories and measuring instruments;</li> <li>-ability to recognize situations in everyday life in which mathematical knowledge can be applied;</li> <li>-innovation and creative thinking;</li> <li>-ability to think critically;</li> <li>cultural, ethical, aesthetic and work habits, criteria and abilities.</li> </ul>	<p>The aim of teaching mathematics in primary school is to ensure that all students acquire basic language and mathematical literacy and to progress towards the realization of appropriate standards of educational achievement, as well as to:</p> <ul style="list-style-type: none"> <li>-train students to solve problems and tasks in new and unknown situations;</li> <li>enable students to express and explain their opinions and disc strain with others;</li> <li>- develops motivation for learning and interest in the subject contents;</li> <li>-ensure that students acquire the basic mathematical knowledge required for understanding of phenomena and laws in nature and society;</li> <li>- enable students to apply the acquired mathematical knowledge in solving various tasks from life practice;</li> <li>- is the basis for success continuing mathematics education and for self-education;</li> <li>- contributes to the development of mental abilities, forms her scientific view of the world and versatile development student personality.</li> </ul>	<p>The goal of teaching mathematics in primary school is for students to acquire basic mathematical knowledge needed to understand phenomena and laws in nature, fully master the basic elements of mathematical language and terminology, develop the ability to express general mathematical concepts, develop skills of higher levels of thinking, abstract, critical thinking and logical reasoning, develop habits for independent work, responsibility towards oneself, others, towards work and obligations, accuracy, precision, orderliness, systematicity and conciseness in written and oral expression, develop competencies necessary for building humane interpersonal relationships and nurturing human values in order to trained for continuing education and applying the acquired knowledge in everyday life, in practice, and in the work of modern society.</p>	<p>The goal of teaching mathematics is to acquire the basic mathematical knowledge necessary for understanding phenomena and laws in nature and society, to acquire basic mathematical literacy, and developing the ability and skills to solve mathematical problems</p>

mathematical content given in the programs. Process goals include skills and values that are developed during and in the learning process. The main goals of teaching mathematics in Serbia are to ensure that all students acquire basic language and mathematical literacy and to progress toward the realization of appropriate standards of educational achievement. The main goals of mathematics teaching in Bosnia and Herzegovina are for students to acquire basic mathematical knowledge necessary for understanding phenomena and laws in nature, fully master the basic elements of mathematical language and terminology, develop the ability to express general mathematical concepts, and develop higher levels of thinking. The basic goals of teaching mathematics in Croatia are the acquisition of basic mathematical knowledge necessary for understanding phenomena and laws in nature and society, the acquisition of basic mathematical literacy, and the development of abilities and skills in solving mathematical problems.

Table 2. The tasks of teaching mathematics in Montenegro are for the student to acquire the skill of reading and writing numbers, master the basic arithmetic operations and be able to calculate freely, easily and accurately.

The tasks of teaching mathematics in Serbia is to create various opportunities for achieving the goals of teaching mathematics, as the

goals of education, are fully realized through various contents and forms of work during the teaching of mathematics; - Numerous literacy for successful engagement in any profession and achieving quality of life.

The task of teaching mathematics in Bosnia and Herzegovina is to assess and understand the quantitative and spatial relationships and laws of various phenomena in nature and society.

The task of teaching mathematics in Croatia is that the student should learn to express himself mathematically in writing and orally.

### Integers

Whole numbers is a teaching topic that is in the curriculum of Montenegro, Serbia, Bosnia and Herzegovina, and Croatia. Whole numbers is a teaching topic that is in the curriculum of Montenegro. It aims to: The introduction of negative integers should be motivated by practical reasons (temperature, altitude, positive and negative current account balance, revenues - expenditures...). The problem of the feasibility of arithmetic operations in a set of natural numbers should also be pointed out. Students should be reminded of two ways to use the + and - marks: - marking addition and subtraction operations - signs of positive and negative numbers. The terms opposite number, absolute

**Table 2: Mathematics teaching tasks in Montenegro, Serbia, Bosnia and Herzegovina and Croatia**

Montenegro	Serbia	Bosnia and Herzegovina,	Croatia
<p>That the student acquires the skill of reading and writing numbers, masters basic arithmetic operations, and is able to calculate freely, easily, and accurately;</p> <p>For the student to get acquainted with basic mathematical concepts: set, operation, relation, function, as well as standard notation for the stated concepts;</p> <p>That the student gets acquainted with the basic units of measurement;</p> <p>That the student gets to know the most important plane figures, spatial shapes, and bodies, as well as their mutual relations;</p> <p>To develop students' skills in using geometric accessories; to enable the student to accurately measure geometric objects; to nurture in students the ability to model and construct geometric figures;</p> <p>That the student adopts the mathematical statements that will be stated in the program;</p> <p>To enable the student to collect data from the environment and present them numerically, graphically, tabularly, or in some other way; to be able to read and interpret the data presented in some of the mentioned ways;</p> <p>That by choosing examples from the student's environment, mathematics is interpreted as a life discipline that helps us to solve some specific tasks; citing examples from physics, chemistry, biology, and geography develops awareness of the presence of mathematics in natural science;</p> <p>To develop students' awareness of the universality of mathematical language, as a means of communication;</p> <p>To develop and nurture mathematical literacy in students;</p> <p>To enable the student to use mathematical literature;</p> <p>To develop and nurture systematic, persistence, conciseness, creativity, and logic in written and oral interpretation of student's</p>	<p>Creating various opportunities for achieving the goals of teaching mathematics, as well as the overall goals and objectives of education, are fully realized through various contents and forms of work during the teaching of mathematics; – numerous literacy for successful engagement in any profession and achieving quality of life; - acquiring knowledge necessary for understanding quantitative and spatial relations; laws in various phenomena in nature, society and everyday life; - acquiring the basic mathematical culture necessary for perceiving the role and application of mathematics in various areas of human activity (mathematical modeling), for the successful continuation of education and inclusion; - developing students' ability to observe, see and think logically, critically, analytically and abstractly; - develop students' cultural, work, ethical and esthetic habits, as well as the excitement of mathematical curiosity; - acquiring the ability to express in mathematical language, clarity and precision of expression in written and oral form; - acquiring basic facts about assemblies, relations and maps; – overcoming basic operations with natural, integer, rational and real numbers, as well as adopting the basic features of these operations; - getting to know the most important geometric objects: lines, figures and bodies and understanding their mutual relations; - training students for precision in measuring, drawing, and geometry of construction; - preparing students to understand the appropriate content of natural and technical sciences; - developing positive attributes of the student's personality, such as: systematic, persistence, accuracy, orderliness, objectivity, self-control and a sense of autonomy; - acquiring habits and skills of using different sources of knowledge.</p>	<p>Assessing and understanding quantitative and spatial relationships and legality o various phenomena in nature and society, Adopting the elementary mathematical culture necessary to understand the role and successful applications of mathematics in various fields of human activity, and for the successful continuation of education and involvement in the work process; Reading and understanding mathematical texts and symbolism of different levels of complexity and structure; Developing the ability to observe, observe, creative and abstract thinking and reasoning; Developing the duration of curiosity, interest and motivation in acquiring mathematical knowledge and building a positive attitude towards mathematics; Mastering basic mathematical symbols and their applications; Developing and nurturing cultural and work habits, aesthetic and ethical values; Using the knowledge acquired in teaching other subjects and experiences of everyday life in their mathematical education; Acquiring and developing abilities and habits for successful use of various sources of knowledge; Developing the competencies needed to build, develop and nurture human interpersonal relationships and human values.</p>	<p>The student should learn to express himself mathematically in writing and orally,</p> <p>Develop the skill of writing, reading, and comparing numbers,</p> <p>Acquired mathematical knowledge to be able to apply in everyday life,</p> <p>Develop the abilities and skills of basic mathematical problems needed for continuing education,</p> <p>To know mathematics as a useful and necessary part of science, technology, and culture,</p> <p>To train for abstract thinking, logical reasoning, and precise formulation of concepts,</p> <p>Develop a sense of responsibility and criticism of one's own and others' work,</p> <p>Develop the ability to work independently, responsibility for work, accuracy, neatness, precision, and conciseness in written and oral calculation;</p>

(Contd...)

Table 2: (Continued)

Montenegro	Serbia	Bosnia and Herzegovina,	Croatia
<p>task, as well as the ability to think abstractly. It is very important that the student is able to read the task carefully, understands the conditions, and understands what is required of him/her. With a good choice of tasks, it is desirable to create situations in which students can express their creativity. By insisting on the analysis of the setting and solution, the child is placed in the role of a small researcher: he is given the opportunity to take a critical look at the solution, to express his opinion on what will happen to the result if the input data changes the freedom to just make some variation on the analyzed task; Mathematics should be an intellectual challenge for students, an area of their self-affirmation. The tasks for primary school are as follows that most can be done by all students, with more or less effort. The solution to each task requires intellectual effort. The moment the student solves the task, will have a confirmation of his intellectual identity; mathematics has its own esthetics, which can be approached by students. Nurturing a sense of mathematically beautiful should be a constant concern of teachers. Of course, by developing this feeling, the overall sense of beauty also develops; in mathematics teaching, opportunities should be used to divide children and solve problems in such formed groups. This form of work is inspiring for students, additionally motivates them; there is an abundance of ideas in the groups on how to solve the task. Working in groups nurtures the need for students and develops a sense of teamwork; to acquaint the student with the history of mathematics and its general civilization character. Special attention should be paid to the influence of mathematics on the development of natural sciences.</p>			

value, and comparison of integers are introduced using a number line. The rules of addition and multiplication of integers are motivated by practical problems (temperature measurement, altitude, sea depth, revenues - expenditures.). The addition of integers should also be illustrated on the number line. The subtraction operation in set Z should be introduced using the addition and subtraction connection in set N. Dividing should be defined as the operation inverse to the multiplication operation. The properties of addition and multiplication operations are illustrated with concrete examples.

Whole numbers is a teaching topic that is in the curriculum of Serbia. It aims to: Understand the concept and need of a negative number. They can represent integers on a number line and compare them. They can add and subtract two integers. They can multiply and divide two integers Calculate the value of a simpler expression with operations of multiplication and division of integers, including the release of parentheses. They use integers and numerical expressions in simple real-world situations. They know how to determine the opposite number and the absolute value of a number. Applies sum properties. Solve more complex tasks by combining operations of addition and subtraction of integers. They solve numerical expressions with multiple arithmetic operations of different priorities and release from parentheses. Applies numbers and numerical expressions in real situations. Whole numbers is a teaching topic that is in the curriculum of Bosnia and Herzegovina.

It aims to: Forms the concept of positive and negative numbers using some mathematical and practical reasons: solving equations, feasibility of computational operations, and calculations with quantities that can change in two opposite directions (time, movement right - left, up - down, longitude and width, etc.). Define the term opposite number on the number line by connecting it with the central symmetry. Emphasize the meanings of addition and subtraction as opposed to signs for arithmetic operations of addition and subtraction. First define a set of negative integers and introduce another name for the set of natural numbers (as a set of positive integers), and then define a set of integers. Illustrate the absolute value and compare integers on a number line and use the term "point coordinates." Addition of integers is performed using examples of temperature conditions, changes in river water level, altitude - sea depth, gain - loss, etc. Then illustrate the addition on the number line and after several examples of oral calculation introduce the definition of the addition of integers. Introduce the subtraction operation as the inverse of the addition operation, thus achieving one of the goals of extending the set of natural numbers to the set of integers. Use appropriate real-world examples to introduce the definition of multiplication in a set of integers. After that, give tasks in which the products of two factors are calculated, and then move on to products of several factors. Define division as the inverse of a multiplication operation. Show operation properties addition and multiplication by examples. Solve the equations in the set Z on the basis of the properties



Table 3: Curricula for VI (VII) grade of primary schools by learning outcomes and contents

Montenegro	Serbia	Bosnia and Herzegovina	Croatia
<p><b>INTEGERS</b></p> <p>They know which numbers make up a set of integers and know the notation Z for a set of integers;</p> <p>Adopt the concepts of positive and negative integers;</p> <p>They know the relation;</p> <p>They know how integers are displayed on a number line;</p> <p>Determine the number opposite to the given integer;</p> <p>They determine the absolute value of a given integer;</p> <p>Determine integers given an absolute value;</p> <p>They know which numbers make up a set of integers and know the sign Z for a set of integers;</p> <p>Adopt the concepts of positive and negative integers;</p> <p>They know the relation;</p> <p>They know how integers are displayed on a number line;</p> <p>Determine the number opposite to the given integer;</p> <p>They determine the absolute value of a given integer;</p> <p>Determine integers given an absolute value;</p> <p><b>RATIONAL NUMBERS</b></p> <p>He knows that the set of rational numbers consists of positive and negative fractions and the number 0;</p> <p>He knows that q is a notation for a set of rational numbers, and he knows the relation;</p> <p>Knows how rational numbers are represented on a number line;</p> <p>He knows how to determine a number opposite to a given rational number;</p> <p>Knows how to determine the absolute value of a given rational number and determines the rational numbers to which the absolute value is given;</p> <p>Compares rational numbers;</p> <p>Sums rational numbers and applies addition properties in simple problems;</p> <p>Subtracts rational numbers;</p> <p>Multiples rational numbers and applies multiplication properties;</p> <p>Divides rational numbers;</p> <p>Determines the values of numerical expressions with rational numbers;</p> <p>Calculates the value of a double fraction;</p> <p>Writes a rational number in the form of a decimal number and vice versa;</p> <p>Solves equations in the set q;</p> <p>Solves inequalities in the set q and on the number line denotes the sets of solutions of these inequalities.</p> <p><b>ELEMENTARY COMBINATION TASKS</b></p> <p>Adopts the product rule on simple examples;</p> <p>Know the situations in which counting can be done by applying product rules;</p>	<p><b>INTEGERS (ADDITION, SUBTRACTION, EDIT)</b></p> <p>The notion of a negative number.</p> <p>A set of integers (Z). Integers on the number line</p> <p>Opposite numbers.</p> <p>Absolute value of an integer Comparing integers Adding integers Subtracting integers Addition laws</p> <p><b>TRIANGLE (TERM, PAGES, CORNERS)</b></p> <p>The concept of a triangle.</p> <p>The sides and angles of a triangle</p> <p>Relationship of pages and types of triangles to pages</p> <p>Triangle angles.</p> <p>The sum of the angles of a triangle and the types of triangles The relationship between the sides and the angles of a triangle</p> <p><b>INTEGERS (MULTIPLICATION AND DIVISION)</b></p> <p>Multiplication of integers</p> <p>Dividing integers</p> <p>Computational operations with integers and their properties</p> <p><b>TRIANGULAR (CONFORMITY, CONSTRUCTIONS, SIGNIFICANT POINTS)</b></p> <p>Matching triangles</p> <p>The first and second rules of coincidence of triangles</p> <p>The third and fourth rules of triangle congruence Triangle congruence</p> <p>Basic constructions of triangles (SUS and SSU)</p> <p>Basic constructions of triangles (SSS and SSU)</p> <p>Described circle of the triangle</p> <p>Inscribed circle of a triangle</p> <p>Orthocenter of a triangle</p> <p>Triangle centroid</p> <p><b>RATIONAL NUMBERS (ADDITION, SUBTRACTION, ARRANGEMENT)</b></p> <p>Set of rational numbers (Q) Rational numbers in decimal notation</p> <p>Comparing rational numbers. Absolute value</p>	<p><b>FRACTIONS IN DECIMAL FORM</b></p> <p>Decimal fraction notation. Decimal numbers. Convert a decimal number to a fraction of the form <math>a(b \cdot 10^N)</math>. Assign the points of a numerical half-line to decimal numbers.</p> <p>Comparison of decimals numbers.</p> <p>Rounding decimal numbers. Basic arithmetic operations with decimal numbers. Numerical expressions.</p> <p>Equations (equations) and inequalities (inequalities) set+Q (decimal notation). <b>INTEGERS</b></p> <p>The notion of a negative integer. A set of integers. Assign integers to numeric points right. Opposite numbers. The absolute value of an integer. Arrangement in a set of integers numbers. Basic arithmetic operations in a set of integers and their properties. Equations and inequalities in a set of integers.</p> <p><b>RATIONAL NUMBERS</b> Introduction to a set of rational numbers. Positive and negative rational numbers.</p> <p>Representation of rational numbers on the number line. Comparing rational numbers. The absolute value of a rational number. Decimal notation of a rational number.</p> <p>Basic arithmetic operations in a set of rational numbers (in Form b a and in decimal notation) and their properties. Numerical expressions.</p> <p>Linear equations and inequalities in a set of rational numbers - solving and application.</p>	<p><b>REDUCING FRACTIONS TO COMMON FACTORS</b></p> <p>Key words: Fraction, common factors</p> <p><b>COMPARING FRACTIONS</b></p> <p>Key words: Fraction, comparison of fractions</p> <p><b>NUMERICAL RIGHTS</b></p> <p>Keywords: Fraction, number rights</p> <p><b>ADDITION AND SUBTRACTION OF FRACTIONS</b></p> <p>Keywords: Fraction, addition of fractions, subtraction of fractions, difference fraction</p> <p><b>FRACTION MULTIPLICATION</b></p> <p>Key words: Fraction, multiplication of fractions, FRACTION DIVISION</p> <p>Keywords: fraction, reciprocal fraction, fraction division, fraction quotient.</p> <p><b>ANGLES ALONG THE PARALLEL RIGHTS</b></p> <p>Keywords: Angle, intersection, or transversal</p> <p><b>ANGLES WITH PARALLEL AND COMPARATIVE ARMS</b></p> <p>Keywords: Angle, angles with parallel arms, angles with parallel arms.</p> <p><b>TRIANGLE. RELATIONSHIP BETWEEN THE SIDES AND THE ANGLE OF A TRIANGLE</b></p> <p>Keywords: Triangle, vertex of a triangle, side of a triangle, angles of a triangle.</p> <p><b>SUM OF ANGLES OF THE TRIANGLE</b></p> <p>Keywords: Triangle, angle, and angle measures.</p> <p><b>ANGLE SYMMETRICS</b></p> <p>Key words: Angle, angle bisector</p> <p><b>ANGLE CONSTRUCTION OF 60 °, 30 °, 90 °, and 45 °</b></p> <p>Keywords: Angle and angle construction.</p> <p><b>COMPATIBILITY OF TRIANGLES</b></p> <p>Keywords: Triangle, compatibility of triangles.</p> <p><b>THREE BASIC CONSTRUCTIONS OF THE TRIANGLE</b></p> <p>Keywords: Triangle, construction, and drawing of triangles. TRIANGLE SURFACE Keywords: Triangle, height, and area of a triangle. <b>INTEGERS</b> Keywords: Integer, positive and negative integers. <b>DISPLAYING INTEGERS ON THE RIGHT</b> Keywords: Integer, number rights, unit length. <b>SUPRTON NUMBERS. THE ABSOLUTE VALUE</b> Keywords: Integer, opposite numbers absolute value. <b>COMPARISON OF INTEGERS</b> Key words: Integer, comparison of integers. <b>ADDITION OF INTEGERS</b> Keywords: Integer, addition of integers sum of integers.</p> <p><b>SUBTRACTION OF</b></p>

(Contd...)

Table 3: (Continued)

Montenegro	Serbia	Bosnia and Herzegovina	Croatia
They do simple combinatorial tasks that use a product rule. TRIANGLE Explain the concept of a triangle and distinguish the types of triangles; They use standard mathematical symbolism to denote triangles, vertices, sides, and angles of a triangle; They learn and use the theorem on the interior and exterior angles of a triangle; They learn and use the theorem on the relationship of sides and angles in a triangle; They learn and use the theorem on the relationship between the sides of a triangle; Adopt the notion of congruence of triangles; They use the positions of coincidence of a triangle; Adopt elementary constructions of a triangle; Adopt the concept of the circumference of a triangle and the procedure for its calculation; They define a circle described around a triangle, they know how that circle is constructed, as well as where the center of the circle described around an acute-angled, right-angled and obtuse-angled triangle is; They define a circle inscribed in a triangle, they know how that circle is constructed; They learn what height is in a triangle and construct heights in a triangle, they know what an orthocenter is and they know where the orthocenter is in an acute-angled, right-angled and obtuse-angled triangle; They learn what the center of gravity of a line/length is in a triangle, construct the center of gravity in a triangle, know what the center of gravity of a triangle is, and know the theorem on the center of gravity of a triangle; They know the concept of the midline of a triangle and they know its properties. SQUARE Explain the term quadrilateral and use standard notation to denote the vertices, sides, and angles of a quadrilateral.	Addition of rational numbers Subtraction of rational numbers Laws of addition of rational numbers  SQUARE The notion of a quadrilateral. The sides and corners of a quadrilateral. Angles of a quadrilateral Parallelogram - concept and basic properties Central symmetry Types of parallelograms Trapezoidal parallelogram constructions - basic properties, middle line Basic RATIONAL NUMBERS (MULTIPLICATION AND DIVISION) Multiplication of rational numbers Division of rational numbers Calculation operations in set Q and their properties Expressions with rational numbers EQUATIONS AND INEQUALITIES Equations related to addition and subtraction Inequalities related to addition and subtraction Equations related to multiplication and division Inequalities related to multiplication and division Percentages Surfaces of Square and Triangle The concept of surface. The area of a rectangle Parallelogram surface Surface of a triangle Trapezoidal surface	ANGLE AND TRIANGLE Repetition of the notion of angle. Equality of angles. Angles with parallel arms. Angles with normal in short. Triangle. Types of triangles according to sides and angles. Triangle angles. Sum of angles triangle. The ratio of sides and angles in a triangle. The ratio of the sides in a triangle. Constructions of some corners (600, 1200, 450, 750, 1350). Matching triangles. Application of triangle matching rules. Basic constructions of a triangle. Rectangular triangle. Significant points of a triangle and their constructions. Central and peripheral angle. The mutual position of the line and the circle. Construction of a tangent circle. Reciprocal position of two circles. Described and inscribed circle of a triangle. SQUARE. SCOPE AND AREA OF TRIANGLE AND QUADRANGLE Quadrangle. Types of quadrilaterals. Angles of a quadrilateral. Parallelogram. Properties of parallelograms. Types of parallelograms. Rectangle. Rhombus. Square. Parallelogram constructions. Trapeze. Trapezoidal properties. Midline trapezoid. Trapezoidal constructions. Deltoid. Concept and properties. Deltoid constructions. The circumference of a triangle and a quadrilateral. Surface measurement. Parallelogram surface. Surface of a triangle. Trapezoidal surface. Surface of a quadrilateral with normal diagonals.	INTEGERS Keywords: Integer, subtraction of integers, difference of integers WORK WITH BARRIERS Key words: Brackets. MULTIPLICATION OF INTEGERS Keywords: Integer, multiplication of integers, product of integers DIVIDING INTEGERS Keywords: Integer, division of integers, the quotient of integers POSITIVE AND NEGATIVE RATIONAL NUMBERS Keywords: Rational number, positive and negative rational numbers. DISPLAY OF RATIONAL NUMBERS ON THE RIGHT Keywords: Rational number, number rights. COMPARISON OF RATIONAL NUMBERS Keywords: Rational number, comparison of positive and negative rational number and comparison of two negative rational numbers. ADDITION, AND SUBTRACTION OF RATIONAL NUMBERS. Keywords: Rational number, addition, and subtraction of rational numbers, sum of differences of rational numbers. MULTIPLICATION AND DIVISION OF RATIONAL NUMBERS. Keywords: Rational number, multiplication and division of rational numbers, product, and quotient of rational numbers. EQUATION OF SHAPE $ax+b=0$ Key words: Linear equation with one variable (unknown), solution of a linear equation with one unknown, and equivalent equations. APPLICATION OF LINEAR EQUATIONS Keywords: Linear equations with one unknown, unknown magnitude, equivalent equations. SQUARE Key words: Quadrilateral, diagonal, parallelogram, trapezoid. SUM OF ANGLES IN A SQUARE Key words: Quadrilateral, angle measure angle. CONSTRUCTION OF PARALLELOGRAMS. Key words: Parallelogram, drawing and construction of parallelograms. SURFACE PARALLELOGRAM AND TRAPEZIUM Keywords: Parallelogram, trapezoid, parallelogram surface and trapezoidal surface

of computational operations, and use the properties of inequalities and the properties of computational operations to solve inequalities.

Integers is a teaching topic that is in the curriculum of Croatia. It aims to: distinguish between positive and negative integers and recognize them in examples from everyday life. Displays integers on the number line. Understands the term opposite number; determine the absolute value of an integer; Determine integers if their absolute value is given. Assign integers sorted by size. adopts the procedure of addition of integers, the procedure and properties of addition by applying it in tasks from life situations. Adopt the procedure of subtracting integers; apply knowledge in solving simpler tasks. Masters the process of calculating expressions with parentheses. Determine the product of integers; recognize a common factor in simpler tasks; applies the acquired knowledge in solving tasks from everyday life. determine the quotient of two integers; does written computing, pocket computing and assessment in solving tasks from everyday life.

### Rational numbers

Rational numbers is a teaching topic that is in the curriculum of Montenegro, Serbia, Bosnia and Herzegovina, and Croatia.

Rational numbers is a teaching topic that is in the curriculum of Montenegro. It aims to: Negative fractions are introduced through examples from everyday life (part of debt, finer measurement of negative temperature...). The decimal notation of a positive fraction should be repeated so that students can adopt the decimal notation of a rational number. Gathering operations should be illustrated with graphical representations and practical problems in order for students to gain insight into the application of the acquired knowledge. An important role is played by the tasks in which the student has to determine the smallest interval with integer ends that contains a given rational number, as well as the tasks of rounding and approximate calculation. The properties of addition in the set  $Q$  should be confirmed by examples. The operation of subtraction in the set of rational numbers should be introduced using the relation of addition and subtraction in the set of positive fractions (studied in the sixth grade). The multiplication of rational numbers should be based on the acquired knowledge about the multiplication of positive fractions and the multiplication of integers. The division operation in a set of rational numbers should be introduced using the multiplication and division connection in the set of positive fractions. When solving tasks using the properties of arithmetic operations, it is good to show students different ways of solving the same task, but it is not necessary to require students to solve each task in several ways. The procedures for solving the equations should be illustrated on the scales. After that, we need to move on to solving equations with new methods. An important role in the study of equations is their application to solving textual problems. Therefore, linear equations should be studied thoroughly and not only on formal examples, but they should be applied to tasks from everyday life. Procedures for solving linear equations are processed in order from simpler to more complex with the constant application of new procedures for solving textual problems. First, the equations are solved by applying the rules of switching the member of the equation from one side of the equals sign to another, and then the equations that are solved by applying the rules of multiplication and division of the left and right sides of the equation by the same number. Finally, equations containing fractions and parentheses should be studied.

Rational numbers is a teaching topic that is in the curriculum of Serbia. It aims to: Understand the concept and need of a rational number. They can represent rational numbers on a number line. Compare the rational numbers of the same record by size. They know how to add and subtract two rational number of the same record. They know how to determine the value of a rational number. They can multiply and divide two rational numbers of the same record. They understand the concept of percentage and its application. They know how to determine the percentage of a given number. They compare the rational numbers of different records by size They can add and subtract rational numbers of

different records. They calculate the value of simpler expressions with multiple arithmetic operations of different priorities, including the release of parentheses, with rational numbers of the same record. Solve simpler equations with rational numbers. They use rational numbers and numerical expressions in simple real-world situations. They apply a percentage calculation in simple real-world situations. They solve more complex expressions by combining operations of addition and subtraction of rational numbers. They solve more complex numerical expressions with rational numbers of different notations. Uses rational numbers and numerical expressions in real situations. They solve equations and inequalities, applying them in more complex textual tasks. They apply a percentage calculation in more complex situations. Rational numbers is a teaching topic that is in the curriculum of Bosnia and Herzegovina. It aims to: Introduce first a set of negative fractions and then a set of rational numbers. Repeat with students the decimal notation of a positive fraction so that they can adopt the decimal notation of a rational number. Extend addition and subtraction operations already defined in the set of integers from the set of integers to the set of all rational numbers. Confirm by examples of addition properties in the set  $Q$ , they do not need to be proved. Introduce the definition of subtraction in the set  $Q$  starting from the definition of subtraction in the set  $Q + (6^{\text{th}} \text{ grade})$  and the illustration of subtraction on the number line. Process the solution of equations and inequalities in the set  $Q$  by determining the unknown components of sums or differences based on the dependence of the results on the components. Use knowledge of multiplication of positive fractions and multiplication of integers to adopt rules for multiplication of rational numbers. Divide division as an inverse operation using already known multiplication rules. Solve equations and inequalities based on definitions of multiplication and division operations. Pay attention to the case when the inequality is multiplied or divided by a negative number.

Rational numbers is a teaching topic that is in the curriculum of Croatia. It aims to: Recognize and distinguish between positive and negative rational numbers; writes rational numbers (in the form of fractions and decimal numbers). Organizes the number right, estimates, and determines between which two integers there is a given rational number; on the number line determine the points associated with the given rational numbers by a denominator less than 10. Compare rational numbers written in the form of fractions or decimal numbers and apply the acquired knowledge on examples from everyday life. Adopt procedures for adding and subtracting rational numbers; calculate the procedure of simple numerical expressions; properties of addition and estimation applied in tasks from life situations. Adopt procedures for multiplying and dividing rational numbers; use and apply the acquired knowledge.

### Triangle

Triangle is a teaching topic that is in the curriculum of Montenegro, Serbia, Bosnia and Herzegovina, and Croatia.

Triangle is a teaching topic that is in the curriculum of Montenegro. It aims to: The concept of a triangle has been considered several times in previous classes. Systematic study of the triangle implies that students:

- Freely use the terms sides, vertices, and angles of a triangle
- Recognize the page against the given angle and the angle against the given page
- Know the meaning of the terms height, bisector, and center of gravity along a triangle
- Distinguish the inner and outer corners of the triangle.

The sum of the angles of a triangle should first be determined experimentally on a paper triangle model, and then the proof of the corresponding theorem should be reported. The theorem on the sum of the exterior angles of a triangle can be treated in the same way. The theorems on the relationship between the sides and angles of a triangle should be illustrated by a series of simple problems. The program envisages that students adopt three positions of matching triangles (SUS, USU, SSS). These views are presented without evidence. However,



students need to solve a number of tasks in which these attitudes apply. In the initial phase, you should do tasks with ready-made pictures in which the equal elements of two or more triangles are marked in an appropriate way. After that, we should move on to tasks in which students draw appropriate pictures on their own. Claims about the intersection of side bisectors, angle bisectors, heights, and gravitational lengths of a triangle are illustrated with examples and presented without proof.

The triangle is a teaching topic that is in the curriculum of Serbia. It aims to: Understand the concept of a triangle and its elements. They can distinguish the basic types of triangles and draw them. Know the sum of the angles in a triangle. They construct basic angles ( $60^\circ$ ,  $120^\circ$ ,  $30^\circ$ ,  $90^\circ$ ,  $45^\circ$ ). They intuitively understand the concept of matching figures (moving to match). They know how to determine the ratio of angles and sides in a triangle. They calculate the unknown angle of the triangle if the other two are given. They differentiate the positions of coincidence of a triangle. They know how to define and construct significant points of a triangle. They use the basic properties of a triangle in solving problems. They apply the properties of different triangles. They use the basic properties of a triangle and are able to construct them. They apply similarity attitudes in solving more complex tasks.

Ugao i Trougao is a teaching topic that is in the curriculum of Bosnia and Herzegovina. It aims to: The study of the triangle should build on the acquired knowledge of the triangle in lower grades. That is why it is necessary to repeat everything that is known about the triangle and to acquire new knowledge by observation, direct measurement, and experimentation. Form the notion of a triangle as a set of points. Draw corners with parallel and normal arms using accessories. Present all the elements of the triangle and insist that opposite each vertex or corner of the triangle is the appropriate side and vice versa. Determine the sum of the angles of the triangle experimentally on a paper triangle model, and then report the proof that  $a + b + g = 180$ . The relationship of sides and angles in a multi-sided triangle can be observed by observing illustrations or projections from the graph paper of several triangles. Prove the claim • First show the ratio of the sides in a triangle on the appropriate model and then derive the proof of the claim. The opposite claim does not need to be proven. Repeat the coincidence of the line, angles, and geometric figures in general before processing the contents about the coincidence of triangles. Prove the congruence of triangles using an experiment (mechanical motion of a triangle model). You also use an overhead projector. Use the properties of the bisector of the line and the angle in the processing of the center of the circumscribed and the center of the inscribed circle. Experimentally check the center of gravity of a triangle and explain the ratio of the parts of the center of gravity because it is used in determining the radii of the inscribed and described circles of an equilateral triangle. Draw a conclusion about the center of the circumcircle of a right triangle. The basic constructions of a triangle should be based on the application of the rules of congruence and elementary constructions (determining the intersection of two lines, a line and a circle and two circles). Solve constructive tasks in stages, and especially insist on the analysis because it is important for recognizing the dependence of the given elements, as well as for determining all the steps in the construction itself.

Angle and triangle are a teaching topic that is in the curriculum of Croatia. It aims to: Define the concept of cross-section, recognize the angles along the cross-section and their properties, apply the acquired knowledge to solve problems. They recognize, compare, and connect the application between angles with parallel and parallel arms. Distinguish the types of triangles, investigate, and apply the rule of ratio of angles and sides of a triangle. Prove and adopt the claim that the sum of the interior angles of a triangle is equal to  $180^\circ$ . Calculate the magnitude of an unknown angle at a triangle. Adopt the concept of an angle bisector, construct a bisector and investigate its properties, and construct an inscribed circle in a triangle. Construct angles applying the properties of the angle bisector; transmit the given angles. Explore and adopt the concept of compatibility of triangles, and know

how to solve simple problems by applying knowledge of compatibility of triangles. Sketch, analyze, and construct a triangle and discuss the solution. Adopt the concept of triangle height and draw heights for all types of triangles. Using the knowledge of the area of a rectangle, then by drawing come to the formula for the area of a triangle; calculate the area of a triangle if it knows the length of the side and the height of that side; apply the acquired knowledge in tasks from everyday life. SQUARE The quadrangle is a teaching topic that is in the curriculum of Montenegro, Serbia, Bosnia and Herzegovina, and Croatia. The quadrangle is a teaching topic that is in the curriculum of Montenegro. It aims to: The term polygon is defined by generalizing the common properties of triangles, quadrilaterals, pentagons... The difference between convex and nonconvex polygons should be emphasized. Through the tasks, students practice the application of formulas for calculating the sum of angles and the number of diagonals of a polygon. Special attention should be paid to the tasks related to the sum of the angles of a quadrilateral. After general considerations about polygons, we move on to a more detailed study of certain types of quadrilaterals (parallelograms, trapezoids, deltoids). Before that, the terms opposite side and opposite corners, adjacent sides and adjacent corners should be specified. Using the positions on the congruence of triangles, the basic properties of parallelograms should be proved. Better students should also understand the inverse statements (conditions under which a quadrilateral is a parallelogram). The teacher should explain why it is necessary to assign 5 elements for the construction of a quadrilateral. It should also be explained why the construction of certain types of quadrilaterals (parallelograms, isosceles trapezoids, and deltoids) is possible with a smaller number of given elements. The quadrangle is a teaching topic that is in the curriculum of Serbia. It aims to: Master the notion of quadrilaterals and types (observe their models in real situations and they can draw them using accessories). They know the sum of the angles. Solve simpler problems by applying the sum of the angles in the quadrilateral. They understand the properties of different types of quadrilaterals (parallelogram, trapezoid, and deltoid). They use the basic properties of quadrilaterals, parallelograms, and trapezoids and are able to construct them.

Quadrangle. The circumference and area of triangles and quadrilaterals is a topic under this name in the curriculum of Bosnia and Herzegovina. It aims to: Explain the concept of a quadrilateral using the term polygon. Start by observing the objects in the classroom and on the prepared models. Specifies terms: opposite sides and opposite corners, adjacent pages, and consecutive corners. Prove the claims about the sum of the interior and exterior angles of a quadrilateral using the claims about the sum of the interior angles of a triangle and the complementarity of the comparative angles. Students can present this evidence independently with the help of the teacher. Indicates the definiteness of a quadrilateral with five elements. Indicates the conditions contained in the definitions because it reduces the number of necessary elements for the construction of parallelograms, trapezoids, and deltoids. It must be clear to the students why five elements are necessary for the construction of any quadrilateral, and only one for a square. Prove the basic properties of parallelograms: equality of opposite sides, equality of opposite angles, that the diagonals of the poles, and draw the conclusion that these properties also have special parallelograms:

Rectangle, square, and rhombus. Insist that every student knows this evidence. He draws and constructs different deltoids and in different positions in order to correctly understand this quadrilateral because the definition itself is associated with a rhombus and a square. Perform systematization of knowledge about quadrilaterals by presenting a set of quadrilaterals with a Venn diagram (use graph paper or drawings of quadrilaterals). Using everyday examples, introduce the concept of the circumference and area of a triangle and a quadrilateral. Teach them to use the image stacking system to calculate the area of more complicated images using the surfaces of simpler already known images (combinations of triangles, rectangles, etc.).



Quadrangle. The sum of the angles of a quadrilateral, the construction of parallelograms, and the areas of parallelograms and trapezoids is a topic that is under this name in the curriculum of Croatia. It aims to: recognize, draw and correctly mark a quadrilateral; the line of the diagonal of the quadrilateral distinguishes the types of the quadrilateral; analyzes their properties; and recognizes them in the environment. Adopt and explain the claim that the sum of angles in a quadrilateral is  $360^\circ$ ; calculate the magnitudes of an unknown angle. Applying the properties of a parallelogram, he sketches, analyzes, and draws or constructs a parallelogram. Using the knowledge of the area of triangles and rectangles, come up with a formula for the area of parallelograms and trapezoids. Calculates the area of parallelograms and trapezoids in simple tasks from everyday life.

### SURFACE OF SQUARE AND TRIANGLE

The area of quadrilaterals and triangles is a teaching topic that is in the curriculum of Serbia. It aims to: Understand the concept of the area of a triangle and a quadrilateral as well as units of measurement. They know the formulas for the circumference and area of triangles and quadrilaterals. They calculate their volumes and areas based on the elements directly given in the task. They calculate their volumes and areas based on the elements that are not directly given in the task. They convert units of measure, counting them.

### CONCLUSION

The aim of this research is to compare the basic goals and tasks, learning outcomes or contents/concepts, and mathematical curriculum of VI (VII) grade of primary school used in Montenegro, Serbia, Bosnia and Herzegovina, and Croatia. analyzed relatively using document analysis as a qualitative method of analysis. The results of the research show that the curriculum in Montenegro is based on the realization and achievement of cognitive and process goals. Cognitive goals include the knowledge that the student will acquire through the adoption of mathematical content given in the programs. Process goals include skills and values that are developed during and in the learning process. Serbia's curriculum is based on ensuring that all students acquire basic language and mathematical literacy and that they progress toward the realization of appropriate standards of educational achievement. The

curriculum of Bosnia and Herzegovina is based on students adopting the basic mathematical knowledge needed to understand phenomena and laws in nature, fully master the basic elements of mathematical language and terminology, develop the ability to express general mathematical concepts, and develop skills of higher levels of thinking. While the curriculum of Croatia is the acquisition of basic mathematical knowledge necessary for understanding the phenomena and laws in nature and society, the acquisition of basic mathematical literacy, and the development of abilities and skills in solving mathematical problems.

Another important thing to note is that countries such as Montenegro and Bosnia and Herzegovina have a nine-year education system, while Serbia and Croatia still have an eight-year education system. Analogously, it was logical to compare class VI with VII. The analysis of learning outcomes/content of this curriculum shows that some topics are covered in the same period, ie, age, while some topics are covered differently by grades and countries in which they are covered. Of course, there are some teaching outcomes/contents that are only covered in one of these countries and are exclusively related to those countries and the period of their processing.

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