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"THE ROOM OF MYSTERIES" PROJECT FOR THE THIRD GRADE

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Abstract: One of the important components of mathematical competence is the ability to solve practical tasks. According to G. Hristova "... with the teaching of mathematics in elementary classes, the skills to learn, to handle information, to communicate, to work independently and to work in a team are formed in the students" [4]. K. Alexieva stresses in her publication that "key competences are interdependent and represent a set of knowledge, skills and relationships necessary for the individual's personal development throughout life, for building an active civic position and participation in social life as well as for the suitability for his/her realization on the labour market. Through learning in each of the subjects, key competence learning skills are acquired, which includes understanding the personal needs in the learning process and discovering the opportunities and abilities to overcome learning difficulties, both individually and in groups; critical thinking, problem solving and decision making, initiative, creativity, responsibility, teamwork, and other key competences specified in the curriculum [1]. The ability to solve practical tasks develops to a greater extent in group, teamwork on projects. Project work is one of the active learning methods. It is not widely accepted in modern mathematical education in Bulgaria. The reasons for this are many. One of them is the lack of methodological literature on the subject for elementary teachers. Many specialists organize project work with their students, including mathematics, but their experience remains unpopular. Project work is difficult to organize, involves serious planning, and often involves spending money to buy the necessary materials. To successfully integrate into project activities, it is necessary for the young students to have a certain degree of autonomy, organizational skills, communicative skills, teamwork skills, skills for individual search of information, presentation skills, and so on. Teachers with creative abilities and innovative ideas develop, organize, and work on projects in primary school but this is a matter of their goodwill and professional skills. Mathematics teaching specialists in primary schools are in debt to primary school teachers in terms of published methodological work and project activities, including mathematics. Teachers' books for mathematics curricula for primary classes should include developments of at least one class project. This is done in the Bulgarian mathematics training kits of Anubis Publishing House, where I am the author [2] [3]. In this article I will present a description of the project – Thematic Classroom "The Room of Mysteries" for the third grade. It would be good the lesson to be held at the end of the school year. It solves tasks from all of the learning content studied in mathematics in the third grade. The idea of the project is based on the so-called "Escape Room" – a place where participants have to solve a series of puzzles to leave the room. Students of the class will not be locked in their classroom, of course. They will find a locked suitcase in their room that they want to unlock to see what's in it. For better motivation students will be given the role of police inspectors, who will be divided into 6 teams to solve a series of challenges – tasks. The lesson is held in the presence of parents and relatives of the students. A team of "veteran investigators" is formed from the parents, who also have to solve puzzles. Solving each task will lead to the opening of a new puzzle, and so pupils and parents will have to deal with a series of challenges that will lead to the discovery of 7 keys, identical at first glance, only one of which unlocks the briefcase. The prize, hidden away from the students, may be their annual third-grade certificates, may be holiday books for the end of the year as well as small gifts. Materials required for the project are purchased in advance with funds collected from students' parents.
Keywords: mathematics, third grade, project, secrets room

1. INTRODUCTION

Type of project: Thematic Lesson "The Room of Mysteries". Lesson duration: 50 – 60 minutes. Time: end of school year; during the annual review. Venue: the classroom of the 3rd "e" class, 19th School Elin Pelin – Sofia. Participants: 23 third grade students and 4 parents. Organization of the class: 7 workplaces for teamwork: 5 for 4 students, 1 for 3 students, 1 for 4 parents. The tables are placed for team work in 7 groups. Lesson format: An open lesson to parents and relatives of students. Required materials: white sheets A4 format (140 – 150 pieces); white envelopes for letters – small (120 – 140 pieces); white envelopes for letters – A4 format (50 - 60 pieces); padlocks with three-digit code – 12 pieces (2 by 6 pieces); case lock with 7 seemingly identical keys, only 1 of which unlocks the padlock; a business bag with opposite zippers or a small suitcase with opposite zippers; juice straws – 6 packages of 50 pieces; plasticine – 2 boxes; magnifiers – 6 pieces; plastic juice cups – 23 pieces; coloured and white glass decorative stones – about 620 – 630 coloured and 70 white (can be replaced with white and striped beans); drawing tools (lines, triangles) – 23 pieces; pens with UV-flashlight for typo (invisible writing) – 6 pieces; sheet A4 format with a chessboard pattern marked with numeral and Latin letters – laminated – 23 pieces; whiteboard markers – 23 pieces; sheet A4 with the Glagolitic alphabet, under each

symbol the corresponding Cyrillic alphabet is written – 7 pieces; A4 sheets with one Glagolitic phrase written – 7 different sentences – 7 pieces; scissors – 23 pieces (minimum 6 pieces); dry glue (small) – 23 pieces (minimum 6 pieces); empty plastic bottles of mineral water with caps – 72 pieces (6 by 12 pieces); black nylon household waste bags – 6 large; alarm clock (small, with a loud sound of the mechanism) – 1 piece; white sheets with prepared tasks for the teams; colour images of Tangram on A4 sheets; black and white silhouettes of figures for the Tangram game – 23 pieces; a colour pack with sheets in different colours, from which rectangles are to be cut; pens – 27 pieces; black marker – 1 item; boxes for some of the tasks and materials – 6 large with lids and 6 small with lids; lockers with key lock – 6 pieces; double-sided adhesive tape; student awards – 23 pieces (books, gifts, treats)

2. PRELIMINARY PREPARATION

Students are previously divided into 6 teams: 5 by 4 and 1 by 3 students. It is best for the students to draw lots for their distribution to the teams. From the invited parents and relatives of the students, a voluntary participation of 4 parents is agreed in advance. Students and guests enter the classroom, which is organized in 7 tables for teamwork with a total of 27 chairs. Students, as well as the 4 parents, take their seats around the tables set for each team. Each team chooses one leader. The rest of the guests stood along the wall and the windows (on the periphery) of the classroom. The computer bag (briefcase), which is locked with a padlock, is placed on the desk. The bag contains prizes for the participants, as well as the alarm clock, which gives a loud sound of a tick-tock. The teacher tells the students that this morning when he came to work, he found this briefcase (that bag) and heard it tick-tock. Students and guests have to keep silence, and one child and one of the parents are approaching to try and open the bag and hear the sound of clockwork coming from it. It is reported that, due to the danger of a bomb attack, teams of six district police stations in Sofia are urgently called: First, Second, Third, Fourth, Fifth and Sixth District Police Headquarters; a support team of veteran investigators (a seventh team of parents) and consultants from the National Investigation Service were convened as the case is related to school and children (one mentor for each of the six student teams) - the class supervisor, the author of the project, colleagues from other classes, trainee students, parents who are prepared in advance according to the script. Team work is started.

3. TASKS FOR STUDENTS TEAMS

First Task: The leaders open the small box with a cover that is on the table. There are 4 (3) small envelopes in the box – one for each participant in the team. Each envelope contains one rectangle of coloured paper with the following dimensions: 6 cm / 9 cm; 7 cm / 10 cm; 8 cm / 8 cm and 5 cm / 9 cm. For the team of 3 students the dimensions of the figures are: 9 cm / 9 cm; 8 cm / 9 cm and 7 cm / 10 cm. Students from the team should measure and record the sides of the rectangles. Find their circumferences. Finally, the sum of the circumferences of all shapes is calculated. The resulting number is the code for opening a padlock with a three-digit cipher (transition to a second task). The circumferences are: 30 cm; 34 cm; 32 cm and 28 cm (for the five teams) or a total of 124. The circumferences for the sixth team of 3 students are: 36 cm; 36 cm; 34 cm or a total of 104.

Second Task: National Investigation Service officers submit to each team 4 (3) large white A4 envelope punched in one corner and there is a locked padlock with a cipher 124 (104). If the students have made a mistake in the measurement or when calculating the circumference (sum of the circumferences), they must review and resolve the first task again until they reach the correct final answer (the code that opens the padlock). Once the lock is unlocked, each team receives one envelope. The envelope contains an A4 format sheet with a coloured square with the Tangram figure, as well as a black and white image of a silhouette of a figure that is made up of the Tangram parts. Each student must quickly be able to cut out his colourful Tangram and, with the parts, to make his shape silhouette. When finished, the students glue the parts with dry glue to a white A4 sheet. When all the images are constructed and applied on white sheets, the third task is coming.

Third Task: Team leaders open a big envelope labelled "Third Riddle". The envelope has 4 (3) small white envelopes and 1 pen with a UV-flashlight for typo. In the small envelopes for each person of the team there are 4 (3) sheets (1/2 of sheet A4), with tasks written in advance with the typo pen – 1 numeric expression with brackets. Every participant illuminates with his UV flashlight his/her "secret" task, writes it on a white sheet and solves it. First, students write the terms of the expressions and then solve them. All tasks have the same answer. There are also 4 (3) small envelopes in the big envelope, with numbers marked on them. Only one number (on one of the small envelopes) corresponds to the answer to the Third Task (243). The other envelopes contain the numbers: 432; 234; 423. The envelope with the inscription 243 hides a key for a box. The box locked with a padlock is on the table. The Fourth Task is in there.

Fourth Task: The team leaders open the box with the key. There are 4 small sheets (1/4 of sheet A4) with one text task – 4 (3). The pupils themselves assign the tasks they will solve. They work on white sheets. Finally, they have to sum the numbers-answers of the tasks (4 or 3) to get the code.

4.1. The circumference of the equilateral triangle is 234 mm. Find the circumference of a square with a side equal to the triangle side. (Answer 312)
4.2. A car travelled from Sofia to Stara Zagora and passed 112 km, and a bus traveled from Stara Zagora to Sofia and passed 104 km. What distance between the car and the bus if they left at the same time and the distance Sofia – Stara Zagora is 234 km? (Answer 18)
4.3. Petya bought a book and a collection of mathematics. The book cost BGN 15 and is three times more expensive than the collection. How much has Petya paid in total? (Answer 20)
4.4. The distance from Sofia to Vidin is 212 km and is 14 km longer than the distance from Sofia to Melnik. How many kilometres a car will pass starting from Melnik, passing through Sofia and arriving in Vidin? (answer 410)
The sum is 760 (350). Numbers on four small envelopes: 760; 740; 670; 750 Numbers on the three envelopes (for the team of 3 students): 340; 350; 390. In the small envelopes with the above-mentioned answers (sums), the condition of the Fifth Task is found.
Fifth task: Observers from the National Investigation Service place on the tables 4 (3) plastic juice cups filled with glass decorative coloured pebbles. Count the coloured pebbles from your cup and record how many they are. Count the white pebbles and record how many they are. Sum the numbers obtained for the coloured pebbles of each participant in the team and record the number. Sum the number of white pebbles on each participant in the team and record the number. Multiply the two numbers. What number did you get? This is the code for opening the next padlock. Team 1: 954; Team 2: 816; Team 3: 872; Team 4: 708, Team 5: 714; Team 6 (3): 891
Sixth Task: Big white envelopes 4 (3) perforated at one end, with a three-digit code padlock through the holes locked. The padlocks open with the ciphers of the 6 teams obtained in the previous task. Each participant receives one big envelope. Inside, there is a laminated A4 sheet with chessboard pattern. On the board, there are depicted heart and star. The task is to get from the heart to the star by moving only on the knight moves. They use a whiteboard marker. If they fail, clean with a dry napkin. Try again. Each child has a pattern for the knight move in the envelope. They need a white sheet to record their moves with which they have managed to solve the task. For example: D5, E7, C6 ... The variants of each participant are different. When everyone is finished, the team gets a big white envelope with the Seventh Task.
Seventh Task: In a large white envelope there are 4 (3) small white envelopes with one sheet (written in font size 4) and one magnifying glass for the team. Students, in turn, with the magnifying glass read the instances of their task, record them on a white sheet and solve them. Every participant has two instances of actions with three-digit numbers. When they are ready, the Observers give them 4 small envelopes with numbers written on them. Only one of the envelopes has a number that the teams have received in response to the solved examples. This envelope contains the next task.
Eighth Task: In a small white envelope with a written number (coinciding with one of the results of Seventh Task) there are 4 (3) small sheets with a drawing of a combined figure of triangles. You must count and record the triangle types according to the angles. A three-digit number is obtained. Find and record the number of different types of triangles in the drawing. Solution: Rectangular triangles - 5, obtuse triangles - 4, angular triangles - 1. True answer 541. Participants receive 4 (3) large envelope A4 with numbers written. Only one of them has the number 541. (The rest: 441; 321; 521.) In the envelope with 541 there are instructions for the next Ninth task.
Ninth Task: Each team has one black plastic bag with 12 empty bottles of mineral water closed with caps. Students have to open all bottles, look under the caps and find the numbers 2, 3 and 5 written with a black marker on 3 of them. They sit in their seats around the tables and start to create and record all three-digit numbers with these three digits. Only one number opens a lock with a cipher. This is the number 325. The lock lockes, through a perforated hole in one corner, 4 (3) large white envelope containing one sheet – the Glagolitic (cipher) and one sheet A4 with a sentence written with Glagolitic alphabet. The students jointly decipher and record the phrase in Cyrillic. The sentence is an indication – where to look for the last mystery hidden. (There are previously glued with double-sided tapes small envelopes with one secret key in them: under the trash can, under a flower pot, under the teacher's desk, under the team table, under the chairof one of the participant, behind the map on the wall; above the students lockers (for the parents team, team 7) Team 1: Find the puzzle under the trash can, Team 2: Find the envelope under the flower pot, Team 3: Reveal the secret under the desk, Team 4: Find the challenge under the table, Team 5 : Find the secret under the chair; Team 6: Search behind the map.

4. TASKS FOR THE PARENT TEAM

First Task: From straws and plasticine should make three-dimensional models of geometric bodies: rectangular parallelepiped, cube, square pyramid, triangular prism and pentagonal prism.
Second task: With the numbers 3, 4, 5, 6, 7, 8, 9, 10 and 11 to form 3 groups of equal sums. Do it in at least 3 (5) different ways. One option: 3 + 11 + 7; 5 + 6 + 10; 4 + 8 + 9 – sum 21.

Third task: The rectangle circumference is 24 dm and its face is 36 sq. dm. How many rectangles with sides 4 cm and 3 cm can be cut off this rectangle? Answer: 300.

Fourth Task: How many different ways can you sort the letters A, B, C and D so that A and B are not next to each other? Answer: 12 ways.

Fifth Task: In a large white envelope there is one sheet – the Glagolitic (cipher) and one A4 sheet with a sentence written in Glagolitic alphabet. Parents from team 7 jointly decipher and record the Cyrillic phrase. The sentence is an indication – where to look for the last mystery hidden. Team 7: Find an envelope on the locker.

Additional Task for Team 7 (Parents):

Find out what is the number at the place of the character "?".

1000 – 374 = 3
238 + 12 = 2
137 - 44 = 0
599 + 66 = 4
111 – 103 = ?

Answer: 1.

5. CONCLUSION

Team leaders gather at the locked bag (suitcase) and try each with their key to open the padlock. One of the keys opens the padlock. When they successfully open the bag – there is one alarm clock and awards for the participants: the third-grade certificates, a holiday book and small gift items and treats for the participants. A prize for the parents' team can also be considered. It is possible for pupils and their relatives to have a little celebration with a cake for the graduation of the school year.

LITERATURE

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