WHY DO I STUDY MATHS?

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Recent research of Bulgarian students on the issue of studying maths has shown lack of motivation to study and lack of adequate knowledge. That is why, as a mathematics teacher of 5-7th grade students, I set myself the aim of showing them why they need to study mathematics. I work under the motto: *Life is mathematics and something more*. I try to put my students in creative, real life situations where they apply their mathematical knowledge from school. Working in groups is the main method I use. The students are divided into groups according to their preferences. Participation is voluntary, but the rate of interest is very high and actually all children take part.

One of the possible options is an excursion, a trip or an event outside school. In advance the children are given the task to divide at will into teams, which are to make projects showing the application of their maths knowledge when describing given information and resolving situations they have encountered.

For example, at the beginning of 5th grade, just after studying the unit of *Addition and Subtraction of Decimals,* we organized a trip to the mountain region of Etropole. We also visited a private ostrich farm. A week after we returned, we organized a mathematics competition for the best project. The students showed a great deal of creativity, diligence and enthusiasm. They combined the photos they had taken on order to create and solve maths problems. Here are some of them:

The first site we visited was *Saeva Dupka* cave.

Cave problem:

The cave is 205,5m long and we are moving at a speed of 30m/min. How long will it take us to go to the end of the cave and back, also adding a 35-minute lecture.

Задача

- Родителите на Живко го пратили на екзкурзия с 12,78лв.В хотела предлагали сок от 1,20лв,сода,която е три пъти по-евтина от сока.Кока-колата е четири пъти по-скъпа от содата.Той си купил 3 сока 2 соди и 1кока-кола.Една трета от остатъкът дал на заем на приятел.С колко пари се е върнал Живко?

Problem:

Zhivko's parents sent him on an excursion with 12.78lv (lv=lev is the Bulgarian monetary unit). In the hotel, a glass of juice cost 1.20lv, a bottle of soda was 3 times cheaper than the juice. A can of cola was 4 times as expensive as the soda. Zhivko bought 3 glasses of juice, 2 bottles of soda and a can of cola. He lent a third of the change to a friend. How much money did Zhivko have when he returned home?

Prohodna cave is 262m long and 45m high. How many times is its length greater than its height?

Пещерата ,,Проходна" има размери 262 метра дължина и 45 метра височина.Колко пъти дължината ù е по-голяма от височината?

В една щраусова ферма продават щраусови пера:малки по 0,50 лв.;средни - 2,30 лв.;големи - 2,50 лв. и снопче от пера - 6,00 лв.
Колко общо струват голямо, средно, малко перо и снопче?
С колко снопчето струва повече от голямо, средно и малко перо общо?

In a ostrich farm they sell ostrich feathers: the small ones cost 0.50 lv, the middle ones- 2.30 lv, the large ones- 2.50 lv and a bundle of feathers costs 6,00 lv.

How much does a large, middle, small feather and a bundle of feathers cost altogether?

How much is a bundle of feathers more expensive than the sum of a small, middle and a large feather?

- Щраусът тича средно със 70 km в час.
- Той може да поддържа тази скорост 18 минути.
- Какво разстояние в километри ще измине той за това време?

Млад, наистина мога!

Was'n hier

- An ostrich runs at a speed of 70km/h on average. It can maintain this speed for 18 minutes. What distance, measured in kilometers, will it cover for this time?
- A school bus with students on excursion covered 20.1 km from the town of Teteven to the road fork for *Rai* rest-house. Then the students travelled another 5.9km by a cargo mini-bus to the rest-house where they stayed the night. On the following day the students

went back to Teteven. How many kilometers did they travel to pass the night at the rest-house?

Another form of group work is an open-door event during the optional mathematics lessons after completing a definite unit. For instance, after *Number Divisibility* in 5th grade and *Stereometry* in 6th grade, students produce necklaces for their mothers as presents for Mother's Day - 8th March. In the first case they use beads, calculating in advance how many beads of each colour they need to buy and how they should arrange them in order to produce a beautiful, extraordinary, one of a kind necklace. They do the calculations applying the number division rules.

In the second case, the children divide into groups at will and produce "jewellery" out of coloured macaroni and other kinds of cereal combined with beads. They use their imagination, too, while making and colouring the cartboard jewellery boxes, which again are shaped like the studied geometry shapes. The event takes place in the Stara Zagora History Museum where the children learn what jewellery have Stara Zagora women have worn from antiquity till the present day.

The group work after the *Rational Numbers* unit also aroused considerable interest. In the days just before Christmas the groups had to do the shopping for the celebration on their own. Each group was given 30 lv and had to provide a special kind of food. The first group bought drinks, the second- confectionery, the third- savouries and the last group was to buy fruit. One of the mothers provided transport for the kids to the shops they had chosen. She secretly took photos which we later arranged into an album which was greeted with a lot of laughter at the Christmas party. The children often faced situations when they wanted to buy something but did not have enough money so they had to come up with a better money allotment. The Christmas party was organized as a cocktail.

At the end of the *Proportions* unit the students made a project whose topic was *The Golden Section.* Again they worked in groups according to their preferences and each group prepared one of the following subtopics-*The Golden Section as a Concept*, *The Golden Section in Mathematics*, *The Golden Section in Biology*, *The Golden Section in Art* and *The Golden Section in Architecture*.

$$\rho = 1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cfrac{1}{1 + \cdots}}}}$$

Златното сечение – едно необикновено откритие

$$\frac{1}{\varphi} = \varphi - 1 \approx 0,6180339887\ldots$$

$a+b$ is to b as b is to a

The Golden section-an extraordinary discovery   Masquerade Ball

There is a lot of beauty and originality in the Masquerade Ball or Fashion Show, organized in 5th grade with masks and hats, after having studied *Surface Areas of Figures*. This task is individual. During the winter holidays each student is asked to make a mask and a hat out of paper using as many of the studied figures as possible. The event takes place at the end of January.

All these activities, open to parents and other teachers at the school, are evaluated by a jury, which always consists of different members. The jury participants include scientists from the Union of Scientists- Stara Zagora, members of the local Union of Mathematicians and also celebrities. The ranking for the 1st, 2nd and 3rd place is done according to criteria announced beforehand. The students are informed of them before they form their groups and before they are given a task. A main criterion is variety in the application of the knowledge from the particular unit, creativity and originality, whether everyone has taken part in the project realization, as well as artistic skills exhibited in the demonstration and the defence of the project. All students I teach participate in these activities. When the 6th grade students have a competition, their classmates from the 5th grade surprise them with original performances. The top achievers get an excellent mark in the optional mathematics lessons.

Participation in all these events as well as the results from maths competitions during the academic year contribute to the students' being nominated in the *Mathematician of the Year* contest in honour of the National Leaders' Day (1st November). The winner receives a special prize, a crystal owl and an honorary diploma.

Students are informed of the annual competition criteria at the very beginning of 5th grade. They are the following: 1. An excellent mark(6.00 according to the Bulgarian grading system) in maths for the previous academic year; 2.Only excellent marks in maths during the current academic year until the jury meeting; 3. Maximum participation in mathematical contests and greatest number of points received altogether; 4. Participation in a maximum number of awarded projects.

The mass participation of children and their eagerness to participate motivate them to study and to realize why they have to study maths and what its applications in their everyday lives are. On the other hand this approach makes students join their efforts and acquire teamwork skills. They get a sense of unity and cooperation. They help each other and exchange information on the given topics. For example, the 6th grade students help their 5th grade classmates with the modelling of their projects because the 5th graders have more limited experience with technology.

This kind of work contributes to the achievement of my final aim: development of the children's creative thinking by means of mathematics.