BODIN VIDEREGAENDE SCHOLE AND OUR DIDACTICAL SITUATION*

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Resumé

Článok vznikol v rámci projektu Socrates Commenius 2.1 v nórskom Bodoe. Venujeme sa tematike riešenia úloh zameraných na obsahy rovinných útvarov v prvom ročníku strednej školy v nematematickej triede formou súťaže.

Abstract

The article arose in the frame of The socrates Commenius 2.1 Project in Norwegian Bodoe. We devote the subject of solving the problems aimed at the area of plane shapes at the first level of High achool at no – mathematical class.We use the form of competition.

Résumé

Cet article a été créé dans le cadre du projet Socrates Commenius 2.1 à Bodoe en Norvégie. On s'adonne à la résolution des tâches concernant des calculs de l'aire des objets du plan en troisième dans une classe non mathématiques. On utilise le mode des compétitions.

Sommario

L'articolo è sorto all'interno dell'organizzazione del progetto *Socrates Comenius 2.1* nella città di Bodoe in Norvegia. Prendiamo in considerazione l'argomento della risoluzione di problemi legati all'area di figure piane al primo livello di scuola superiore in una classe non matematica. Sfruttiamo la forma della competizione.

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Zusammenfassung

Dieser Artikel entstand im Projekt Socrates Comenius 2.1 während unseres Aufenthalts im norwegischen Bodoe. Wir befassen uns mit dem Thema: Das Lösen von Aufgaben die sich auf den Flächeninhalt von Merhecken beziehen. Dies wurde in der ersten Klasse der Mittelschule ohne mathematische spezialisierung in Form eines Wettbewerbs realisiert.

Most of the observation time we spent at the Bodin Videregaende Schole. The school is situated close to University and belongs to bigger ones. It has about 1000 students and about 60 teachers. The school is divided into 5 departments (navigators, nurses, sports, electricians…). The school has very good facilities and nice environment. Because of our specialization we participated at mathematics. We observed lessons, environment at the lessons, teaching methods and the work of the students.

We had very good relationship with teachers so we could ask them everything we hadn't understood. We found out that the organization of mathematics lessons is based on degree of difficulty student wants to take. They have levels MX, MZ for each grade. The level MX is more difficult than the level MZ and students who take level MX usually want to continue in mathematics all three years and will have something in common with mathematics at university. This organization is different from our country. The positive thing we saw was that the students who get to the level 3MX have very good knowledge and are very good in mathematics.

During our observation we saw a lot of classes with different levels. In decision, which class would we realize our didactical situation in, helped us the fact that most of the classes wrote during these 2 weeks tests. So we didn't have a lot of possibilities. After discussion with our tutors and checking the topics they were talking about we choose the class from health and social department. These students weren't very bright and also interested in mathematics. They have only 3 lessons a week of mathematics. The goal of the lesson was to practice solving problems of areas. Concerning to this situation we decided to prepare for them lessons with competition to keep the aim, but also to attract them.

Preparation of the didactical situation

Subject: planimetry

Topic: evaluating areas of planar shapes

Time to realize our project: 2 lessons

Method: Competition

Ability of students

The abilities, which we think, that students have:

- Solving problems using the formulas
- Transformation of square measurements

Description of lessons

First lesson:

We have prepared 9 problems, which students can solve. The solving problems will be organizing like a competition. The stundets will be devided into 4 – 5 groups. The students of each group can decide, which problems they want to solve and what order in. The difficulty of problems is from easier ones up to more difficult ones. For each correct solved problem they will get some points. The group with highest score will be the winner.

10 min – introducing us, who we are, where we live, to tell them something about our educational system at mathematical lessons,our plan for them

5 min – dividing into groups, preparing table for writing score on the blackboard

30 min – solving problems

Second lesson:

We would like to solve the most difficult problems from the first lesson and at the end give them a simple test without using calculators. The students in the test will have to estimate a result in easy exercises.

5 min – evaluation first lesson, declaration winners

15 min – test (estimating results and solving easy counting problems using only elementary aritmetical operations without using calculators)
25 min – delivering right solutions of all problems to students, solving the most difficult problems and explainig their solution either individually or on the blackboard

We would like to prepare some video sequences and pictures from those lessons and than use them in our presentation.

First lesson

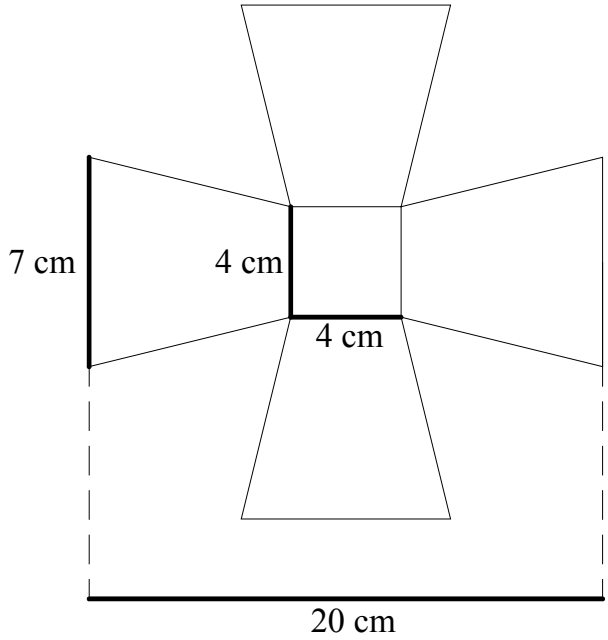
Introduction:
Placing the Slovakia in Europe
Capital of Slovakia – Bratislava
The way of education – similarities and differences comparing to Norway
Lessons of mathematics and elements used to motivate students

Dividing into groups – it will depend on the number of students in the class (8-10). They can divide themself into groups in their way. The maximum number of students in each group should be 3.
Solving problems – they will have time up to the end of the lesson to solve problems. When they solve some of them, they will wave to 'their supervisor' (each of us will have one or two groups, it depends on the number of groups in the class). Their supervisor will pick their solution up, check it and write their score into the table on the blackboard.
Problems, which they have to solve:

1. Transform (convert):

3 m	=	cm	3 m^2	=	cm^2
14 mm	=	dm	14 mm^2	=	dm^2
941 cm	=	m	941 cm^2	=	m^2
0,3 mm	=	m	0,3 mm^2	=	m^2
52 cm	=	dm	52 cm^2	=	dm^2

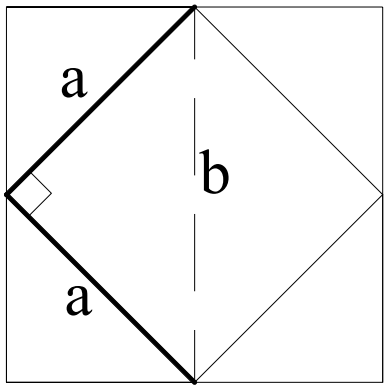
2. Just imagine - you will have to do a paper water cup of this shape



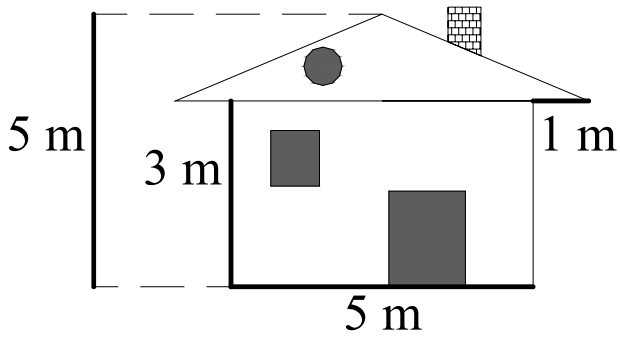
How many square cm (cm^2) of paper will you need for making this cup?

3. Trousers – According to the last fashion hits, the company PYTACLOTHES has decided that all trousers will have stitched in a stripe with ornaments in the both sides. In March they are preparing trousers with this ornament (see picture). How many ornaments will they need for the trousers of the length 104 cm?

$$a = 4.\sqrt{2}\ cm$$

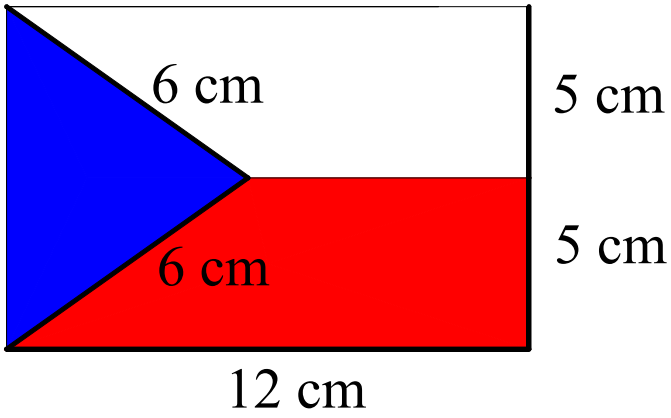


4. House – how many square meters (m^2) of wood should we use to rebuild the front part of this house. Dark parts of the house take 3 m^2?

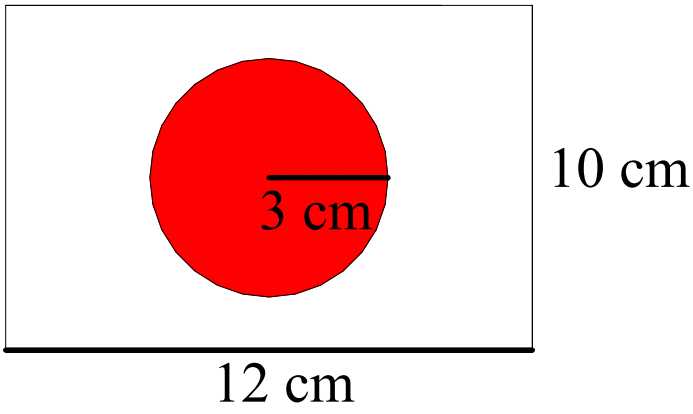


5. Flag –

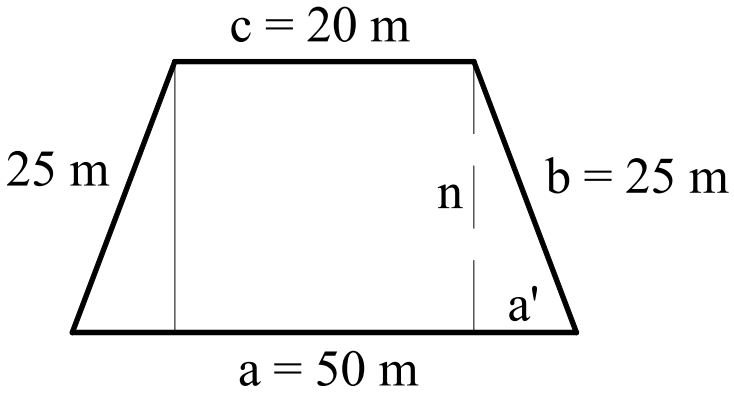
a) You are going to paint the flag. How big area of all colors (white, red and blue) do you have to paint to get the flag of Czech Republic?



b) You are going to paint the flag. How big area of all colors (white and red) do you have to paint to get the flag of Japan?



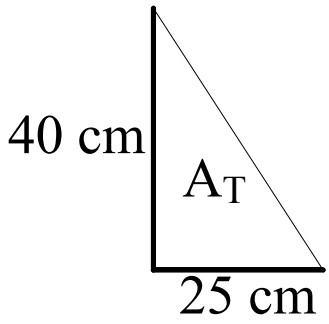
6. Garden – Mr. Motyka has a garden of trapezium shape. How big area can he use to plant vegetables, if his house takes off 15% of the garden, the building for tools takes off 8%, pavements take off 11% and the lawn in front of the house takes off 3% ?



7. Tiles – The worker is going to pave the hall of size 6m x 8m with tiles of triangle shape (see the picture)

a) How many tiles will he need?

b) How many tiles does he have to buy if he should count with the 15% of garbage?

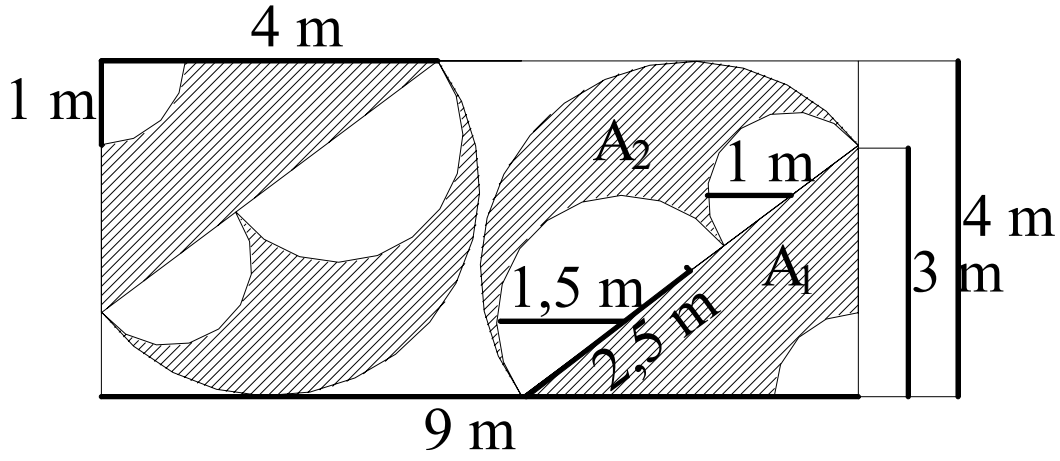


8. Ornaments – The headmaster of the school got an idea to paint an interesting matematical picture on the wall of the school hall. With the teachers of math they decided for this picture (you can see the wall with ornament inside)

a) Count the area of stripped ornament

b) How many 2kg cans of the colour will they need to buy, if for $1m^2$ is spent 0,43 kg.

c) How many kilogramms of colour will be left after painting?

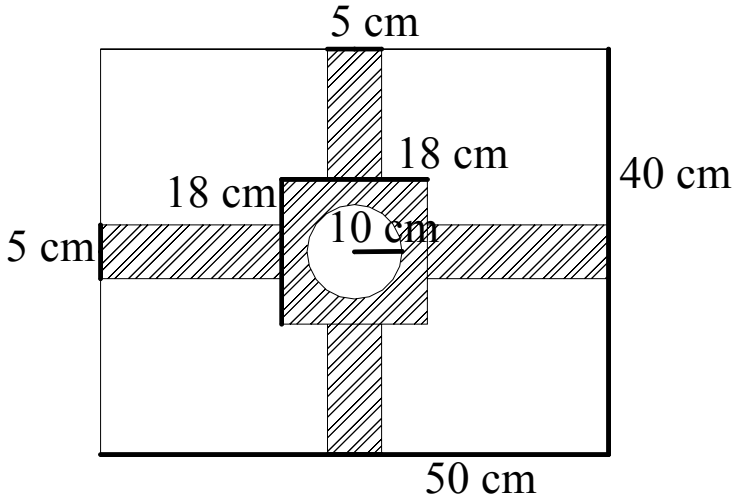


9. Park – On the picture you can see the plan of a park. The striped part is a pavement. The circle in the middle is a fountain and the rest is lawn. Count the total area:

a) of pavement

b) of lawn

c) of fontain



At the end of lesson each group will have to give us solutions, even not finished ones.

Second lesson

Evaluation of the first lesson – during the break we will prepare the final results of the competition on the blackboard. At the beginning of the lesson we will summarize all problems and declare the winners

Test – everyone will have to try to solve it.

The first part of this test is estimation of those exercises:	The second part of this test is solving this excercises:
21 . 33	–70 + 16
42 . 89	–12 + 35
0,7 . 0,21	–32 – 49
13 + 79	12 – (+5) – (-6)
22,9 + 56 + 93,8	–6 + (-5) + (-9)
3 . 12 + 2 . 34	–6 – (-10) + (-2)
2 . 18,1 + 3 . 98,9	–2,5 – (+3,1) + 4
0,23 . 0,3	–9 – (-7) + (-3) – (-2) + 8
717 : 7	–2 . 7 . 5 . (-3)
12 . 1,20	24 : 4 + 6 . (-2) + 8
	(5 – 13) : 2 . (-5) . (3 – 5)

Delivering right solutions of all problems to students, solving the most difficult problems and explainig their solution either individually or on the blackboard (it depends on number of unsolved problems).

What we expected from these lessons

Students will be a little surprise of it

They will work hardly then in other lessons because of new motivation

There will be very good climate in the class

How we will evaluate solution

We'll evaluate each important step in the problems with 1 point. Maximum points for each problem is:

Problem	1	2	3	4	5	6	7	8	9
Max. points	5	5	5	4	9	5	7	13	11

Realization

Before the first lesson the teacher Ola Pedersen gave us the list of paper how the groups would look like (who will work with whom). All four of us entered the class as well as their teacher. We started the first lesson with some facts about our country – Slovakia, our educational system and the way of teaching mathematics compared with theirs.
After this short introduction students were listening how we imagined that lesson. We explained the basic rules and system of working in groups of two. We made a table for score on the blackboard at the same time. We divided the students into four groups (two in each) and each group had one of us as a supervisor.

When everything was clear and everybody understood what this competition would be about, each group got a list of problems to be solved.
They started to solve what they had got. We were watching their cooperation and helping them. We were making some video sequences and pictures during their work. Besides that we checked solution of their tasks and wrote the points on the blackboard.

However everything was not on time (according the schedule we made before the lesson started). When the lesson was close to the end, we decided to change our schedule. Students didn't solve enough problems that we could see some differences in the final countdown. Plus, we also thought that this lesson would have bigger effect if the students could have more time for working on the problems. So after teacher had agreed with our suggestion, we joined both lessons and moved the break to the end of the next lesson. We let them solve the problems 30 more minutes and then we summarized the score and declared the results. After this we asked them to sit separately – each student at one desk. That took a little time. This was followed with the second part of our project: we made a quick test. Because of the unplanned delay we realized just the first part of it. The students were supposed to estimate results of easy mathematical problems (including addition, multiplication and division) without using calculators. One of us explained what this test would be about and he wrote some kinds of enrollments that could be different from ours. Then we started. The other supervisor were writing the problems on the blackboard and changing them every 20 seconds. We were checking

the time and organized whole test. After the test we finished these two lessons by finding out students' impressions from the time they had spent with us.

Evaluating and final results

Table of scores after competition:

Group/exercise	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**SUM**
Group1	3,5	n	n	4	9	n	2	n	n	**18,5**
Group2	5	5	n	4	6	5	7	n	n	**32**
Group3	4,5	n	n	n	n	n	n	n	5	**9,5**
Group4	4,5	5	n	4	9	2	4	n	n	**28,5**
Max. points	**5**	**5**	**5**	**4**	**9**	**5**	**7**	**13**	**11**	**64**

Evaluating of the test and final score of students:

Number of exercise	Marcus	Vibeke	Silje	Suzane	Terese	s6	s7	s8
1	1	1	1	0	0	n	n	n
2	0	0	0	0	0	n	n	n
3	0	0	0	0	0	n	n	n
4	1	0	1	1	0	1	1	1
5	0	1	1	1	0	n	n	0
6	n	1	1	1	0	n	n	n
7	1	0	1	0	0	n	n	n
8	0	0	0	0	0	n	n	n
9	1	1	0	0	n	n	n	n
10	1	1	1	0	n	n	n	n
Sum of points:	5	5	6	3	0	1	1	1

Reactions of students and teacher after project

Students:

This lesson was kind of different from what they are used to. List of problems we gave them was half in Norwegian and half in English. Students expected a little bit easier problems to solve. There was a hardworking atmosphere in the class and each group was trying to do their best. Most of them started with the easiest problems, but soon they realized it was a competition, so they began to solve the problems according to the highest score they could achieve. They were concentrating on doing as much as possible and the groups didn't talk to each other. They were allowed to use anything they wanted, so they used their exercise books, schoolbooks and calculators of course. The students were so busy and enthusiastic about their work that they agreed not to have a break between those two mathematical lessons.

Students were not prepared for the second part – the test, so they were a little bit confused of it. Some of them found the test hard and gave up – didn't write the results.

And on the other side some of them were very interested about their score.

At the end of these lessons students said that they liked the test much more than the first part.

Their teacher seemed to be kind of strange and was scared of the fact that we chose his class to realize our project. The system of preparing our lesson was different from the one he was used to. But finally, when everything was over teacher said he had liked this kind of lesson and promised he would realize similar tests as we prepared at the end.

Teacher:

The teacher had been quite afraid of the lessons. He had been afraid of difficulty of problems. But during his mind was changing during the lesson. He could see the possibility of choice of the problem referring to his difficulty. He also saw the interest of students and he liked it He even liked the test although the results weren't very good. After the lesson he told us about his plan to practice this test more often to give students more experience with numbers. His attitude was really positive and he advice this test to the other colleagues.

Summary of the lessons

All of us are satisfied with what we did. We were trying to prepare the lesson in order to motivate the students and we think we reached our goal, because everybody was working well. The problems, we had chosen, were easy understood and presented in an interesting way. The activity in the class was appropriate to what we had expected.
Referring to the test given to students, we didn't want to give a picture of Norwegian student using calculator, because we know that to state this fact we need more research. We only wanted to show the students that they can play with numbers even guessing the results. We are sure that some of them could recognize this necessity to be able to estimate for example the final price in the shop.
We would like to thank you to our tutors for patience, hosting us, advising us and giving us an opportunity to spend some lessons with them and to lead two of them.

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