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# PRACTICAL ACTIVITIES IN THE V$^{TH}$ GRADE MATHEMATICS EDUCATION[7]

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***Abstract:*** *The paper presents comparative analysis between the old and the new version of mathematics curriculum and textbooks for 5$^{th}$ grade. The new version included some practical activities, which help to form and develop mathematical and digital competences of students. The purpose was to research the differences and to underline the advantages of the practical activities, included in the new curriculum. Some mathematical problems for 5th grades students, are presented.*

***Keywords:*** *Mathematics Education, Practical activities, Competence.*

## INTRODUCTION

One of the most authoritative international studies to determine the effectiveness of school education is the Programme for International Student Assessment (PISA) [3], which is carried out by the Organisation for Economic Co-operation and Development (OECD). The results obtained by PISA have an impact on the educational policies of the countries and regions involved in the research. PISA evaluates the functional literacy of 15-year-old school pupils' in the fields of mathematics, natural sciences, and reading [4]. The importance of the notion of literacy used in PISA is related to the ability of students to use their acquired knowledge and skills at school in real life situations. This meaning is wider than what is common to the ability to read and write.

The report "Natural Sciences and Technologies in the 21st Century School" of the Center for Monitoring and Evaluation of School Education at the Ministry of Education and Science [7] examines the results of the Bulgarian ninth graders participating in PISA in 2015. 72 countries / regions participated in the survey and the main focus is on the natural sciences. Bulgaria is 45th, with Bulgarian pupils showing a significantly lower score than the average for OECD.

Over the last 10-12 years, reforms have been implemented or are being implemented in many countries, which are somewhat influenced by the international research. Reforms aim at enhancing the quality of education and training so that the school builds proactive individuals to deal with real problems and to be competitive on the labor market.

Changes in math curricula are also part of the reforms being undertaken.

## EXPOSITION

Since the 2016-2017 academic year, a new fifth-grade mathematics curriculum has been in place [2]. Ordinance No 5 of 30.11.2015 on general education [1] points the specific objectives of the training:

- Learning the natural numbers and the principle of the formation of the sequence
- of the natural numbers.
- Mastering calculus algorithms - addition, subtraction, multiplication and division.
- Mastering knowledge of units of measurement for length, mass and time, and the ability to act with homogeneous numbers.

[7] Presented a plenary report of October 26, 2018 with the original title: PRACTICAL ACTIVITIES IN THE VTH GRADE MATHEMATICS EDUCATION

- Recognizing geometric shapes.
- Formation of initial skills for measurement and drawing.
- Developing skills to describe real world situations with mathematical models.
- Building skills to apply some rational approaches in solving tasks.
- Making interest in mathematics.
- Building skills for self-control and self-assessment.

An overview of the curriculum content of the old and new programs [2] shows that in both programs the content is divided into the following five themes: *Divisibility, Simple Fractions, Decimal Fractions, Basic Geometric Figures,* and *Geometric Shapes,* but the sequence is different. The annual number of classes for the subject is 136 hours in both programs. Both programs include an introduction of simple and decimal fractions, which are the first extension of the set of natural numbers known from primary school. The concept of percentage is introduced in both the programs, and attention is paid to graphical interpretation of data using diagrams, histograms and pictograms. In this way a gradual introduction of probability and statistics theory is carried out in accordance with the world trends in mathematics education.

Geometric material is covered in the themes *Basic Geometric Figures* and *Geometric Shapes*. This training material is practical and develops the students' spatial thinking, observation and imagination.

Based on the comparative analysis between the old and the new Math curriculum for fifth grade, several distinctive aspects of the new curriculum can be identified:

1) The geometric material is covered in two themes and is concentrated at the end of the curriculum;

2) Each topic is described in detail with the titles of all subtopics it includes;

3) Contains practical activities, through which the learning material is easier to learn and interrelationships are realized;

4) For the interpretation of data the use of pictograms is also provided, additionaly to diagrams and histograms.

The new curriculum allows for practical activities that can be realized in the classroom:

- Perform arithmetic actions using a calculator.
- Make measurements on objects or models in the shape of the studied figures and bodies.
- Design models of cube and rectangular parallelepiped.
- Draw geometric figures on a square mesh.
- Construct a perpendicular from a point to straight line and heights in a triangle using a rectangular triangle.
- Use program products to demonstrate geometric figures and rectangular parallelepiped and cube.
- Use different sources to read and interpret data, presented with text, tables, or diagrams.
- Graphical and tabular data representation information should be used to form the ability to answer questions related to the corresponding table or graph (for example, to merge data, to make calculations with the data, to draw conclusions).

Practical activities help to form and develop the following key competences: *mathematical competence; basic competences in the field of technology; digital competence; social and civic competences; initiative and entrepreneurship.*

By comparing the content of two textbooks for the 5th grade, respectively in the new and the old curricula [5], [6], the following positive elements are found in the new textbook:

- Problems related to research, applied mathematics, finance, and entertaining tasks are included in the topics;
- There are instructions for the more difficult tasks;
- Each topic begins with a motivation on the need to study the learning material and with information where it is applied in our lives.

The anticipated changes are expected to have a positive effect on the educational process by raising pupils' interest and motivation, as well as greater efficiency in teaching and learning the material.

Practical-applied tasks that can be solved in math classes are shown below.

**Task 1.** The table shows the cost data in BGN for a household for the first quarter of 2018. Calculate the total cost for each month and complete the sentences.

| Month / Cost for | January | February | March | Total |
|---|---|---|---|---|
| Food | 200 | 225 | 220 | 645 |
| Clothes and Shoes | 235 | 240 | 260 | 735 |
| Transport | 74 | 115 | 90 | 279 |
| Electricity and Heating | 220 | 235 | 185 | 640 |
| Water | 20 | 25 | 30 | 75 |
| **Total** | | | | |

**a)** In month _____ the highest electricity and heating bill was paid.
**b)** In month _____ the lowest water bill was paid.
**c)** In month _____, total costs are the highest.

**Task 2.** The chart represents the time required for students in one class to solve a task. Complete the sentences, using the data.

**a)** There are _____ students in the class.

**b)** The number of students who solve the task for 5 minutes is _____.

**c)** The number of students who solve the task for more than 20 minutes is _____.

**d)** The number of students who solve the task for 15 minutes or less is _____.

**e)** The number of students who solve the task for more than 10 minutes is _____.

**f)** _____% of the students solve the task for 10 minutes.

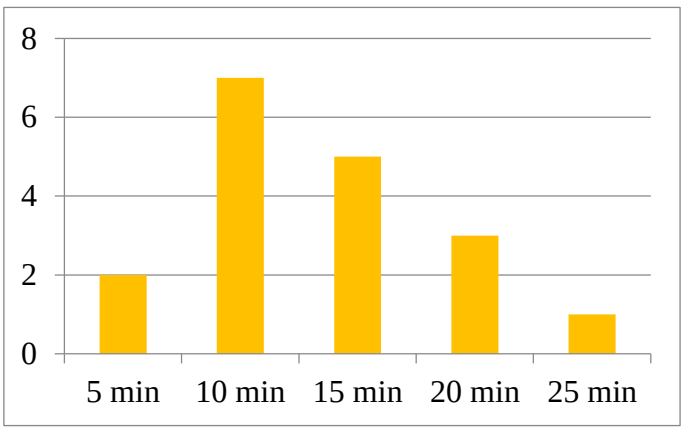

Fig. 1

**Task 3.** The circle diagram depicts the preference of 120 fifth-graders from one school to different sports. Complete the table.

| Sport | Football | Swimming | Basketball | Volleyball |
|---|---|---|---|---|
| Number of Students | | | | |

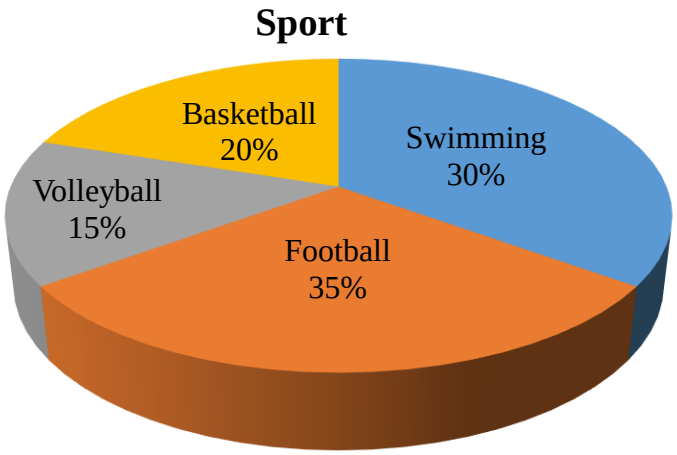


Fig. 2

**Task 4.** The linear diagram shows the amount of composted bio-waste of a small vegetable farm for the first half of 2018. Complete the sentences using the chart data.

In month _____ the most quantity bio-waste was composted.

In the months _____ more than 200 kg of bio-waste was composted

Quantities below 200 kg were composted in month _____.

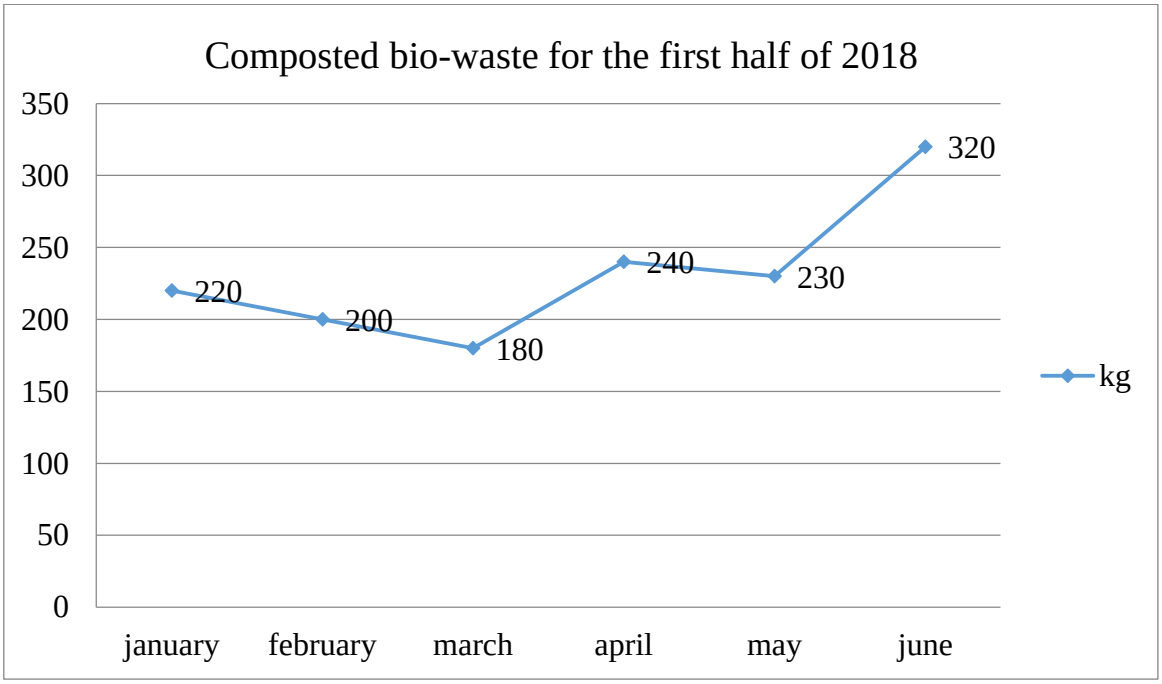


Fig. 3

**Task 5.** The *Izgrev* and *Kiparis* campsites are on the beach. In the camping *Izgrev* there are 36 bungalows. The pictograms show the number of bungalows in both the campsites.

**a)** Determine how many bungalows match one  .

**b)** Determine how many bungalows there are in *Kiparis* camping.

| **Camping** | |
|---|---|
| *Izgrev* |  |
| *Kiparis* |  |

Fig. 4

## CONCLUSIONS

Starting in the early years, math education should be aimed at developing in students the ability to use their knowledge and skills in real life situations. Interest in mathematics, problems related to the protection of the environment and the protection of one's own health could be provoked through appropriate practical tasks.

## REFERENCES

[1] http://mon.bg/bg/59

[2] http://mon.bg/bg/28

[3] http://www.oecd.org/pisa/

[4] http://www.ckoko.bg/page.php?c=11&d=22&page=3

[5] Paskaleva, Z., G. Paskalev, M. Alashka. (2011). Uchebnik po matematika za 5 klas, Sofia: Izdatelstvo "Arhimed 2000" (***Оригинално заглавие:*** *Учебник по математика за 5 клас, София: Издателство „ Архимед 2000"*), ISBN: 978-954-779-126-8.

[6] Racheva, D., I. Kostov, V. Velkova, V. Stoyanova, N. Norman, K. Peit. (2016). Matematika za 5 klas, Varna: Izdatelstvo "San Pro" (***Оригинално заглавие:*** *Математика за 5 клас, Варна: Издателство „. Сан Про"*), ISBN: 978-619-7073-09-6.

[7] www.ckoko.bg/upload/docs/2016-12/book_2016_web.pdf