

OUT-CLASS SCHOOL IN MATHEMATICS – YAMBOL

Since its establishment in 1971, the out-class school in Mathematics - Yambol is working with children from the different schools in town and mainly with the students from the local Mathematical High-School (MHS).

During the last years, the students participating in the Out-class school are from 10-11 up to 17-18 years old. In the Out-class school we have the following groups of students:

MATHEMATICS

Group	school	Number	min/week.	Teacher
IV grade	Local school	60	90	Karlov
V	MHS	30	90	Karlov/Komitova
VI	MHS	30	90	Karlov/Komitova
VII	MHS	30	90	Angelova
VII	Local School	30	90	Karlov
VIII	MHS	30	90	Karlov
IX	MHS	15	90	Ivanov
X	MHS	30	180	Tenev/Dimitrov
XI	MHS	15	90	Petrov/Petrova
XII	MHS	15	90	Tzonev

Computer Science

Group	school	Number	min/week.	Teacher
V-VII	MHS	10	90	Rusko Shikov
VIII-X	MHS	10	90	Anton Shikov
XI-XII	MHS	10	90	Qvor Shikov

Once a month the students from the Out-class school have lectures from a guest teacher from the Sofia University “St. Kliment Ohridski”, the Institute of Mathematics and Informatics at The Bulgarian Academy of Science or by prominent teachers from other towns.

Some of the teachers that have participated in the out-class school are: Emil Kolev, Peter Bojvalenkov, Al. Ivanov, Plamen Siderov, Ivan Tonov, Borislav Lazarov, Kiril Bankov, Svetoslav Savchev, Svetlozar Dojchev, Oleg Muskarov, Sava Grozdev, Plamen Penchev, Ilia Cekov, Dancho Danev, Dimitar Dimitrov and others.

The out-class school in Mathematics - Yambol is established in the autumn of 1971 by the Mathematical teachers Roman Hajnadski and Kosio Kosev.

Many of the participants of the Out-class school have won numerous prizes in local, national and international competitions in Mathematics, but below we will

mention only the participants in the International Mathematical Olympiad (IMO) with medals.

D. Georgiev, Plamen Siderov, Ilia Kalderon, Rusko Shikov, Zdravko Slavov, Krasimir Qnakiev, Ivan Dimitrov, Ilia Krajchev, Dancho Danev, Ilia Cekov,

For the last years the Out-class school is financed by the Board of trustees of the Mathematical High-school – “At. Radev”.

Besides the lectures the Out-class school issues a correspondence course in Mathematics (“Roman Hajnadski”) for students from 4th -7th grade. 500 copies of the course are circulated among students in the country.

During the summer break the out-class school organizes a summer preparation in Mathematics in Nesebar.

Exemplary Mathematical topics for the IVth grade students

1. Logical problems.
2. Extraordinary geometrical figures.
3. Characteristics of the Cube.
4. Pair and Odd numbers.
5. Problems with watches.
6. Equations I.
7. Triangles and Squares.
8. Preparation for Diofant’s Equations.
9. Problems that are solved backwards.
10. Sequence of numbers.
11. Counting elements from a set.
12. Indications for division by 2, 3, 4, 5, 8 and 11.
13. Problems for movement.
14. Calendar Problems.
15. Convex analysis.
16. Dirihle’s Principe.
17. Prime Numbers.
18. Number Automats.
19. Equations II.
20. Division and Remainder.
21. Contradiction Problems.
22. Counting I.
23. The Principe of the last element.
24. Mathematical Games.
25. Problems for age and years.
26. Problems with Balances.
27. Cutting.
28. Transfusions.
29. Diofant’s equations.
30. Invariants.
31. Counting II.
32. Rebuses.
33. **Problems with Matches.**

- 34. Geometrical Sections.
- 35. Point, Line and Plain.
- 36. Fibonacci's sequence.
- 37. Different problems.

33. Problems with Matches

33.1.

Can you make with 12 matches two squares?

Solution: One of the squares has side 2 matches (8 matches) and the other has side 1 match (4 matches). $8+4=12$

33.2.

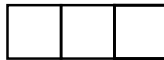
Can you make with 12 matches five squares?

Solution: We make a square with side 2 matches and with the other 2 matches we divide it into 4 squares with side 1 match. By doing so we have one big and 4 small squares.

33.3.

Can you make with 12 matches four squares?

Solution: Let us build with 10 matches three squares in the shape of a line (see bellow).



The last two matches we put vertically in order to border another square (see bellow).



33.4.

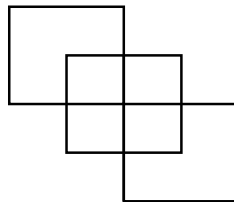
Can you make with 12 matches six squares?

Solution: Cube.

33.5.

Can you make with 12 matches seven squares? (Matches can cross each other)

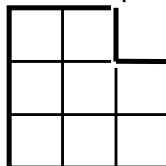
Solution: We build three squares with side 1 match and place them on top of each other as shown on the figure bellow. Count three big and four small squares.



33.6.

Can you border with 12 matches area of 8 square centimeters, if one match is 1 cm long?

Solution: The figure bellow has area of 8 square cm.



33.7.

Can you border with 12 matches area of five square centimeters, if one match is 1 cm long?

33.8.

Can you border with 12 matches area of four square centimeters, if one match is 1 cm long?

33.9.

Can you border with 12 matches area of three square centimeters, if one match is 1 cm long?

33.10.

Can you border with 12 matches a convex figure with area of five square centimeters, if one match is 1 cm long?

33.11.

Can you make with 12 matches six triangles?

33.12.

Can you make with 12 matches seven triangles?

Homework

1. A soccer ball is made out of 32 parts, white hexagons and black pentagons. Each black pentagon is bordered only by white hexagons. Each white hexagon is bordered by three white hexagons and three black pentagons. How many white hexagons are there in a ball?

Answer: 20

2. Place five wooden cubes in space, so that each has common part with the other four.

3. A nephew asked his uncle, how old is he. The uncle answered: "If you add seven to half my real age, you will know my age 13 years ago." How old is the uncle?

Answer: 40 years.

4. In a factory two types of wooden timber is present: 6 m. long and 7m. long. The factory needs wooden timbers, of 1 meter. Which type of timber is more profitable for the factory?

Answer: 6 m.

5. Find the sum $A = 1+2+3+\dots+870$

Answer: 378 885.

PHOTOS



Associate prof. Plamen Siderov discusses problems with teachers.



Mrs. Diana Angelova and her 7th grade students.



Mr. Karlov and one of his students.



Out-class school session.



The first correspondence course “Roman Hajnadski” booklet.

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