

Out - class school – Sofia High School of Mathematics

Location:

Sofia High School of Mathematics

Aria:

Mathematics, Informatics and Mathematical Linguistics.

Aims:

- Discovering and developing of talents in the sphere of exact science;
- Developing the logical thinking of the students, forming an interest in spheres of science and improving their creativity;
- Participation in national and international competitions and Olympiads.

Organization of activities:

- The out – classes school in mathematics, informatics and mathematical linguistics are specialized to exceed the level of the school material in the different disciplines by introducing the students to topics, methods and their applications in the different spheres of mathematics and informatics, which are not objectives of the school course.
- The number of groups is two per grade from 5th to 12th grade (Students in the age from eleven to nineteen);
- In every group there are between ten and twenty five students;
- The lessons are 4 hours a week (144 hours per year);

History:

The specialized out – classes school in the Sofia School of Mathematics have begun in 1980. Since the beginning until 1997 the lessons have been one per grade with six hours a week. Since 1997 there are two groups in every grade, and since 2005 the lessons are four hours a week.

Ones of the first teachers were Mladen Tzenkov, Zdravko Petrov, Veliko Kolev, Mariana Todorova, Penka Nikolova, etc. A lot of teachers have received the prize of the “Sv.sv.Kiril I Metodi” foundation for active results in the sphere of discovering young talents. These are Ivan Simeonov, Rummyana Karadjova, Irina Sharkova, Linka Mincheva, Elena Stancheva, Veliko Kolev, Iliyana Tzvetkova and Boyko Banchev.

Financing:

These out – classes school are financed by the Oborishte community and the pedagogical activity of the Sofia School of Mathematics.

Topics:

The topics, which are developed at the course, are chosen considering the age of the students, and advancing every next grade.

5th, 6th, 7th grade

1. Divisibility, divisibility criterions, GCD and LCM, relatively prime numbers
2. Diophantic equations.
3. Congruences.
4. Tables with numbers. Locations of the numbers.
5. Logical problems.
6. The pigeonhole principle.
7. Combinatorics. Counting. Permutations, combinations, variations.
8. Covering of the chessboards, coloring.
9. Ratio of areas of triangles.
10. Triangulation.
11. Invariants.
12. Puzzles with digits.
13. Principle of the extreme element.
14. Mathematical induction.
15. Semi Invariants.

8th, 9th grade

1. Congruences. Fermat's little theorem, Euler's theorem, Wilson's theorem.
Multiplicative functions.
2. Invariants and semi invariants.
3. Mathematical induction.
4. Covering of the chessboards, coloring.
5. Square grids, Pick's formula.
6. Principle of the extreme element.
7. Inequalities. The power mean inequality. Multivariable inequalities.
8. Polynomials. Irreducibility criteria.
9. Graphs.
10. Rotation of vector. Homology.
11. Geometric inequalities.
12. Ceva's theorem and Menelaus' theorem.
13. Desargue's theorem.

10th, 11th, 12th grade

1. Quadratic function. Graphs of functions and methods for proving the inequalities.
2. Inequalities.
3. Invariants and semi invariants.
4. Problems about extremes.
5. Theory of numbers.
6. Inversion.
7. Complex numbers and their geometry applications.
8. Polynomials.
9. Combinatorics.
10. The function $[x]$.
11. Sequences.

12. Linear recurrence equations.
13. Analysis – limits, continuity
14. Functional equations.
15. Barycentric coordinates.

Results:

The following students have participated successfully in international competitions and Olympiads during the last ten years.

2007

XLVIII IMO - Tzvetelina Tzeneva, Elina Robeva, Alexandar Daskalov;
XIX IOI - Iskren Chernev;
XXIV BMO - Tzvetelina Tzeneva, Elina Robeva, Alexandar Daskalov;
XI JBMO - Daniel Djevelekov, Rafael Rafailov, Daniel Dobrev;
International competition of Kazakhstan - Alexandar Daskalov, Kalin Landjev;
Hong Kong – “Po Leung Kuk” - Petye Yakimova
Hong Kong – EMIC - Lyubomir Papazov, Nikola Bojinov
Hong Kong – AITMO - Viktor Valov, Daniel Dobrev, Mihail Hurmuzov;
XV BOI - Iskren Chernev;
V IOL – Angel Naidenov

2006

XLVII IMO - Tzvetelina Tzeneva, Elina Robeva, Teodor Radenkov;
XXIII BMO - Tzvetelina Tzeneva, Boris Strandjev;
X JBMO – Alexandar Kovachev, Lyuboslav Panchev;
Hong Kong – “Po Leung Kuk” - Daniel Dobrev;
EMIC – Rumén Tomov, Maria Rangelova, Petar Buyukliev;
XIV BOI - Iskren Chernev;
IV IOL - Alexandar Daskalov, Zlatina Tzvetkova, Desislava Radieva and Ivailo Dimitrov

2005 г.

XLVI IMO – Rosen Kralev, Alexandar Lishkov, Ivan Dimitrov, Tzvetelina Tzeneva;
XXII BMO - Rosen Kralev, Alexandar Lishkov, Ivan Dimitrov, Матей Нейков;
IX JBMO - Borislav Valkov, Svetozar Stankov and Eujenia Sotirova;
XVII IOI - Vasil Lyuckanov;
Hong Kong – “Po Leung Kuk” - Kamelia Belcheva, Iva Dicheva, Kubrat Danailov, Viktor Valov;
EMIC - Viktor Valov, Kubrat Danailov, Ivet Galabova and Dimitar Hristov.

2004г

XLV IMO - Alexandar Lishkov, Rosen Kralev, Artur Kirkoryan, Ivan Dimitrov;
XXI BMO - Alexandar Lishkov, Rosen Kralev, Matei Neikov, Artur Kirkoryan,
Математичесла лингвистика - Desislava Radieva;

VIII JBMO: - Kalina Ilieva, Alexandar Daskalov, Iskren Chernev;
EMIC - India - Nikolai Stefanov, Dilyana Radulova, Djan Hien, Dobrin Paskov;
XII BOI - Nikola Borisov;
Hong Kong – “Po Leung Kuk” - Nadejda Aplakova and George Kerchev;
2003г.

XLIV IMO - Rumen Zarev, Ilia Tzekov, Rosen Kralev, Alexandar Lishkov;
XX BMO - Rumen Zarev, Ilia Tzekov, Rosen Kralev, Alexandar Lishkov;
VII JBMO - Tzvetelina Tzeneva, Asparuh Hristov;
XI BOI - Ivan Anev;
XV IOI - Ivan Anev;
EMIC - Tailand - Alexandar Daskalov, Milena Geirgieva, Daria Petrova , Desislava Zamdjieva;

2002г.

XLIII IMO - Vladimir Barzov, Alexandar Lishkov, Rumen Zarev, Ilia Tzekov;
XIX BMO - Rumen Zarev, Ilia Tzekov, Dimitar Ostrev, Alexandar Lishkov;
XIV IOI - Velin Tzanov, George Tzanov, Veselin Raichev;
X BOI - Velin Tzanov, George Tzanov, Veselin Raichev;
VI JBMO - Tzvetelina Tzeneva, Veselina Buyuklieva, Boris Strandjev, Alexandar Vakrilov;
Hong Kong – “Po Leung Kuk” - Tzvetelina Tzeneva, Alexandar Daskalov.

2001 г.

XVII IMO - Vladimir Barzov; Rumen Zarev; Alexandar Lishkov, Tzeno Tzelkov, Nikolai Andreev;
XVIII BMO - Vladimir Barzov, Tzeno Tzelkov, Nikolai Andreev, Nikifor Bliznashki
V JBMO - Ivan Dimitrov; Rosen Kralev, Matei Neikov, Alexandar Vakrilov;
XIII IOI - Velin Tzanov;
IX BOI - Velin Tzanov;
Hong Kong – “Po Leung Kuk” - Tzvetelina Tzeneva, Petar Sharkov, Yordan Marinov, Svetlozar Micov.

2000г.

XVI IMO - Vladimir Barzov, Alexandar Popov, Nikolai Andreev, Tzeno Tzelkov;
XVII BMO - Tzeno Tzelkov, Alexandar Popov, Vladimir Barzov;
IV JBMO - Rosen Kralev;
Hong Kong – “Po Leung Kuk” - Rosen Kralev, Svetlozar Micov, Ivan Dimitrov, Alexandar Vakrilov.

1999г.

XV IMO - Alexandar Popov, Vladimir Barzov
XVI BMO - Todor Tzankov, Tzeno Tzelkov, Alexandar Popov;
III JBMO - Rumen Zarev, Pavel Popov, Dimitar Ostrev, Dimitar Matakiev;
Hong Kong – “Po Leung Kuk” - Alexandar Lishkov, Mariela Vacheva.

1998г.

XXXIX IMO - Ivan Ivanov, Kiril Sakaliiski;
XV BMO - Ivan Ivanov, Kiril Sakaliisk;
II JBMO - Nikolai Andreev, Nikolai Chakarov;
VI BOI - Petar Petrov;
Hong Kong – “Po Leung Kuk”Г - Rumens Zarev, Bilyana Kasabova.

It is impossible to list all the winners that have gone through the courses in regional and national competitions.

Problems:

- The prime problem is financing the participators of Sofia School of Mathematics in national and international competitions.
- The adequate payment of the teachers is the main problem every year.
- The school's base, the organization of study camps, differentiation of the work with our most talented students, attracting young teachers and taking care of their professional growth need a future radical solution.

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