

The International Tournament of Young Mathematicians

REGULATIONS*

Contents: 1. The language – 2. The teams – 3. The problems – 4. The written materials – 5. The Jury – 6. The structure of the ITYM – 7. The stage time limits – 8. The roles – 9. The written reviews – 10. The draws – 11. The grading – 12. The rating – 13. The Final – 14. Moot points – 15. Appendix

1. The language

The working language is English.

2. The teams

- a. Each team represents one country. However, the Organizing Committee (OC) reserves the right to accept more than one team from the same country.
- b. The team is composed of 4, 5 or 6 high school students and headed by a captain.
- c. The team is accompanied by one or two team leader(s).

The team leaders have to register their teams by sending an email to organizers.itym@gmail.com until **May**. An official invitation will be transmitted shortly after the registration.

3. The problems

The list of 9-12 problems is selected by the OC and published on the website <http://www.itym.org/> in **March**.

The problems for the ITYM are estimated as difficult, containing parts with no known solution. The participating students are supposed to solve them by themselves, working with other members of their teams and supervised by their team leaders and teachers.

Conversations with individual mathematicians are allowed. However, public collective help (such as internet forums) is not allowed and any cheating team may be disqualified from the tournament by the OC.

4. The written materials

The teams should type their solutions, even partial, and send the written materials to organizers.itym@gmail.com **four days prior to the tournament**.

Files with extensions PDF are accepted, a separate file per problem, named in the following manner: “Country-ITYM2014-ProblemN.pdf”. There is a **30 pages** and **5 MB** limit per problem (**A4, 11pt**).

* July 9, 2014

The first page of each file should contain the name of the team, the number and the name of the problem, and an abstract (a brief summary of results and methods, about $\frac{2}{3}$ of the page).

The model for the first page:

<p style="text-align: center;">Problem 4: A Baby Chess Team: <i>France 2</i></p>
<p style="text-align: center;">Abstract In this paper we classify the winning strategies for the first player in the case...</p>

These and only these written materials will be discussed during the tournament and no text editing will be permitted. An exception is in the case of correcting minor errors, which should be mentioned during the presentation. Moreover, during his/her performance the Reporter (see section 8) is only allowed to present:

- parts of the written materials with no modification, e.g., exact statements with their original numberings, figures and diagrams,
- sketches of solutions and proofs, and ideas used in the written materials.

All paper and electronic sources (books, articles, etc.) directly involved in proofs should be mentioned in the written materials. For instance, if the team uses an already known and non-obvious result, the result must be stated explicitly and a reference must be provided.

5. The Jury

The Jury for the Rounds and the Final is nominated by the OC. The Jury consists of at least five members and includes team leaders. The team leaders cannot be members of the Jury in the Group where their teams participate.

6. The structure of the ITYM

The ITYM consists of two Rounds and the Final. In each Round, the teams are divided into Groups of 3 or 4 (see also section 10). Within a Group, each team plays the three (four) roles – Reporter, Opponent, Reviewer (and Observer) – according to the tables:

8. The roles

The Reporter presents the main ideas and results obtained while solving the problem. The presentation should be based on the written materials (see section 4). Black or white boards, a laptop and a projector will be available so that the Reporter may use slides. One of the main goals of the Reporter is to make his performance understandable by the audience.

The Opponent analyses the Reporter's solution and presentation, pointing to inaccuracy and errors in the report, as well as to advantages of Reporter's proofs. For the purpose of revealing possible shortcomings, the Opponent draws the Reporter into a discussion of the presented results. The results must be evaluated as follows:

- correct and proven,
- correct with minor inaccuracies,
- correct but not proven (a proof is missing or there are crucial mistakes),
- doubtful,
- wrong.

However, the Opponent should not turn the discussion into an explanation of his/her own solution.

The Reviewer evaluates the presentations of the Reporter and the Opponent by studying positive and negative aspects. One of the main intentions of the Reviewer is to detect whether the Opponent said anything wrong or overlooked Reporter's faults.

The Observer only makes important and useful remarks missed by other participants, otherwise should not participate in the discussion. If the Observer wastes time, the Jury may evaluate the performance by negative marks.

Only one team member may take the floor during each stage, other members of the team are allowed to make brief remarks if the chairman gives permission to the captain of the team.

Within each Round and Final, the roles of Reporter, Opponent and Reviewer must be performed by different members of the team. For instance, the same person cannot be Reporter and Opponent in the same Round, but he/she can be Reporter and Observer.

9. The written reviews

Before each Round and the Final, the Opponent, the Reviewer and the Observer prepare **written reviews** of the Reporter's materials (see section 4) indicating the mistakes they found (one-two pages). In addition to a critical evaluation, a review's author may assign the work a merit rating by enlightening both positive and negative points. A model written review is given in section 15.

The written reviews are graded by the Jury (see section 11).

10. The draws

The composition of the Groups for the first Round is determined by a draw. In order to decide which problem each Reporter presents in a Round/Final, a draw is held at least a day before the Round/Final. The captains of the teams from the same Group draw alternately cards with problems' numbers. A team cannot present the same problem twice in the tournament.

A team may reject up to **six** different problems without penalty during the first two draws, and also up to **six** different problems without penalty during the third draw. For any subsequent rejection, the coefficient k for the report (see section 11) is decreased by **0.5**. The problems presented by the team earlier in the tournament don't count, as well as the problems rejected by the team earlier in the draw.

Within several hours after the draws, the corresponding written materials (see section 4) are distributed to the teams and to the Jury.

The first draw is organized online **three days prior to the tournament**. A public chat will be open, so that everybody will be able to follow the draw under the link <http://www.itym.org/first-draw>. Only the captains of the teams will have the permission to post messages.

Step 1 (Group and Order). An organizer places in a row T cards numbered from 1 to T , where T is the number of teams. Each captain picks a unique integer i from 1 to T and receives the integer written on the i -th card, which will be called the *ordinal number* of his/her team.

The teams are divided into Groups according to their ordinal numbers: 1-4 for the first Group, 5-8 for the second Group, etc.

Step 2 (Problem's Number). An organizer places in a row P cards with numbers from 1 to P , where P is the number of problems. A captain picks an integer n from 1 to P . The organizer suggests the Problem numbered by the integer written on the n -th card. If the captain accepts it then the n -th card is taken away, else the n -th card is turned back over and all cards are shuffled.

The Step 2 is repeated for the next captain within the Group.

The second draw is organized after the first Round. The Steps 1 and 2 are applied. The teams are divided into Groups according to the following rules:

First Round				⇒	Second Round			
	Group 1	Group 2	Group 3		Group 1	Group 2	Group 3	
1 st	A1	B1	C1		A1	B1	C1	
2 nd	A2	B2	C2		C2	A2	B2	
3 rd	A3	B3	C3		B3	C3	A3	
4 th	A4	B4			B4		A4	

The third draw is organized after the second Round. The Steps 1 and 2 are applied.

11. The grading

After all stages the Jury grades the teams, taking into account the written review (x) and the performance together with the participation in the discussion (y). Each Jury member shows an integer mark y from 0 to 10 for the Reporter and integer marks x and y for the Opponent, the Reviewer and the Observer, according to the following table:

	Written review x	Performance and discussion y	Jury's marks	Coefficient k	Resulting points
Reporter	0	$0 \leq y \leq 10$	y	3 or less	$x + ky$
Opponent	$0 \leq x \leq 4$	$0 \leq y \leq 6$	x and y	2	$x + ky$
Reviewer	$0 \leq x \leq 4$	$0 \leq y \leq 6$	x and y	1	$x + ky$
Observer	$0 \leq x \leq 4$	$-3 \leq y \leq 3$	x and y	1	$x + ky$

To calculate the resulting points of a team in the Stage, all marks of the Jury members for the team are summed, multiplying the marks y by the coefficient k . An exception: If there are at least six members in the Jury, then the highest and the lowest marks are not counted.

12. The rating

The rating R_n of a team in the Round $n = 1, 2$ is determined by the formula:

$$R_n = S / TS,$$

where S is the sum of the resulting points of the team in the Round and TS is the arithmetic mean of the resulting points of all teams in its Group.

The rating R of a team before the Final is calculated by the formula:

$$R = R_1 + R_2,$$

where R_1 and R_2 are the ratings of the team in the first and the second Rounds respectively.

13. The Finals

Four teams are selected for the Grand Final in the following order:

- the teams winning the both Rounds,
- the teams with the highest ratings R .

Among the remaining teams, four teams are selected for the Small Final by the same rule.

The final team rating FR in each Final is defined by the following sum:

$$FR = R + \pi \cdot R_F,$$

Where $\pi = 3.141593$ and R_F is the rating of the team in the final, it is calculated in the same way as the round ratings.

14. Moot points

Any moot point during the tournament is subject to consideration by the Organizing Committee and the Jury.

15. Appendix – A Model Written Review

Written review by the team: *your team*

Problem: *number*

Title: *title of the problem*

Reporter: *reporting team*

Summary of the solution

Here, in a few lines, a brief summary of the written material, including which questions have been answered, which one have not been treated, and any remark that may be useful to value the work of the reporting team.

Mistakes and inaccuracies

This is the most important part of the review. Here, the reviewer should make two lists, with precise reference in the written material, of the mistakes he/she found in the document:

- the first one should contain the most important mistakes,
- the second one those, which have a lesser impact.

Both should be listed starting by the most important ones. The reviewer is not to list all typos and irrelevant mistakes. This should be of mathematical interest. The reviewer may explain in a few words how it would be possible to correct the mistake (but not rewrite the whole solution).

Formal remarks

In this part, the reviewer may make a few remarks about the form of the written material, mainly if it has negative consequences on the understanding of the paper. This part is optional.

Qualitative rating of the solution

Here, the reviewer is expected to give his/her opinion on the reporter's work. One should point out positive and negative aspects of the work, and emphasize interesting ideas and methods used in the proofs.

Evaluation. The reviewing team is expected to evaluate the reporting team's work by one of the following adjectives: *excellent, good, sufficient, poor*. The main objective of the reviewer's work is to explain in the previous parts why they give such an evaluation.