RULES OF MMC/"MAMMOTH" COMPETITION (MATHEMATICAL MODELING CONTEST), REQUIREMENTS TO THE TEAMS, AND RECOMMENDATIONS ON WRITING THE PAPER

General rules:

1. The MMC problem is issued on the opening day of the Tournament (21 Nov 2020). The results of this work in the form of PDF-files should be submitted via the DLC system no later than 13:00 24th November 2020 (Moscow time, UTC+3) (the reserve method of submitting is the Tournament's e-mail turnir@internat.msu.ru). All the time from the moment of issuing of the problem and till the submission deadline and free from other Tournament events may be devoted to working on the problem. On the 25th and 26th of November 2020, during the time free from other Tournament events, the teams prepare presentations of their papers. The presentations take place during the conference, held starting at 9:30am on the 27th of November 2020.

2. Each team must work independently. When working on the problem, the team can use any inanimate sources of information: databases, reference books, books and other materials, websites, as well as computers, programs, etc. The ability to find and use such a source positively characterizes the work of the team. Consultation, getting hints and other help from any people other than team members is strictly prohibited. The team's advisor is responsible for meeting this requirement. **The advisor is not a member of the team and cannot give hints to the team while working on the task!**

3. The work is submitted as two separate documents:

    1) Title page with information about the team, including the name of the school, the name of the advisor and the list of team members with classes (grades) indicated (in PDF format) (template is provided);

    2) the main paper **in PDF format**.

The main part of the paper should not contain any information revealing the identity of the team. The papers will be numbered randomly for judging.

Beginning the work:

1. Read the problem in full.

2. Check the correctness of opening data files (they are located in the cloud at the address that will be reported separately). In case of technical problems with these files, contact the organizers of the competition

3. Plan the approaches and methods for solving the problems. Determine what methods and data you need.

4. Try to effectively distribute tasks among the team members. Try to identify such subtasks that can be solved independently and simultaneously.

During the work:

1. The proposed problem is an open research problem and, like real mathematical modelling problems, does not have a predetermined clear mathematical formulation.
    One of the most important stages of solving such problems is to reformulate the problem more clearly, which then allows you to formulate the problem quantitatively (that is, to create a "mathematical model"). Often this requires a preliminary study and the solution of self-posed nested tasks.
    The description of this process and, thus, the reasons and assumptions on which your mathematical model is based, are no less important than the computational algorithm and the final quantitative result.
2. Almost any real problem can be endlessly explored "in depth", taking into account all the smaller and smaller details. The task of the "modeller" is to determine the "depth" on which he should stop and either disregard some details or replace them with simplifying assumptions (both should be described explicitly and, preferably, justified).
3. Estimate the time-span of your work! If some stage of the work is too slow, consider to carry it out at a simpler level (albeit at the cost of reducing the "quality" of the result). An ill-working model is almost always better than a not-working-at-all one.
4. Answering all the questions of the problem is not necessary, but recommended. It is allowed to change the order of answers to questions. The judges are primarily interested in approaches to solutions and research methods.

Result:

1. The results of your work should be presented in the form of a paper of reasonable length.
2. The paper should contain a description of all stages and elements of your work that have any influence on the final result. This, in particular, means that the negative results of the stages, on the basis of which any conclusions were made that affect other stages or the final result, should also be described.
3. The description should be detailed enough so that one can understand and verify the logic of the solution, but it should not be overloaded with insignificant, self-evident and well-known details.
    The structural clarity of the article and the consistency of presentation are extremely important. "Tossing" between various issues greatly hinder the understanding of the essence of the article.
4. It is recommended to discuss in the paper the strengths and weaknesses of the approach used to solve the problem and of the model or algorithm constructed. First of all, important is the analysis of the so-called "model limitations" (i.e. conditions of its applicability).
5. In the article, it is necessary to clearly formulate the suppositions and assumptions used, to define all the variables and constants.
6. When using graphs and tables in an article, you should follow the standard rules for their design, which allow the reader to "read" the material easily: graphs should be in sufficiently high resolution, graph axes should be signed, signatures should be made in a font that does not differ much in size from one used in the text of the article (in order for graphs to be readable without magnification), if there are several graphs in the same axes, there should be a "legend" of the graph; in the tables all columns and rows should be clearly signed (highly

discouraged is the use of non-obvious notations, for decoding of which one needs to look for them in the main text of the article).

7. In the article, given should be the references to all sources of additional information used in the work (articles, books, Internet resources). There is no need to provide references to the sources of well-known information (for example, contained in a school textbook). References should be listed at the end of the article.

8. The number of pages in the paper is not an indicator of its quality. You should not specifically seek to either reduce or increase the volume of the article. However, an excessive amount of "padding" (that is, a text that does not communicate anything essentially relevant to the problem being solved) usually greatly impairs the reader's ability to keep track of the thread of reasoning. Nevertheless, one should adhere to a general restriction on the main paper without appendices - **10 A4 pages in 12pt font, with reasonable margins and 1.5 line spacing**.

9. Although the program code can be placed in the annexes to the article, it will not be directly studied and judged.
   On the other hand, some elements of the 2020's problem may require creating and coding quite unobvious algorithms; so it may worth including the source code in the appendix for an interested reader.