

Joint Statement by the Education Committee of the European Mathematical Society (EMS) and the Association Kangourou sans Frontières (AKSF) 2021

Addressed to educational authorities decision makers and school curriculum reform experts in European countries and beyond

Promote advancement of mathematical interest and talent through competitions

As documented by various studies like TIMSS or PISA, an overwhelming majority of school students faces difficulties in learning mathematics. Apart from teachers' programs that aim at enhancing the teachers' educational competencies in the field of mathematics, further tools to help cope with this unsatisfactory situation include targeted curricular changes for the subject Mathematics as well as extra-curricular offerings to school students.

This joint statement highlights one specific instrument of extra-curricular activities, namely mathematics competitions. These can both provide a rich potential to promote mathematically gifted students and to get school students more interested in mathematics. While focusing here on competitions, it should be emphasized that competitions alone cannot be expected to help to improve the situation on their own. They can, however, be seen as an important add-on.

Among the many national initiatives with mathematics competitions, two prominent international ones are highlighted in this statement as examples: The first of these is the Mathematical Olympiad which culminates in the well-known International Mathematical Olympiad (IMO) as an international competition involving more than 100 countries. The annual competition in its modern form dates back to 1959. This competition addresses particularly gifted school students who are challenged with new types of non-standard problems. On the other hand, we also mention the Kangaroo Competition, which is a popular international mathematics competition taking place in more than 80 countries. The aim of this competition is to get as many school students as possible interested in mathematics and thereby to contribute to the improvement of the mathematical performance of our school students at large.

In general, mathematics competitions can serve as an excellent incentive to challenge systematic and logical thinking as well as to get school students acquainted with the basic concepts of problem-solving. The following four characteristics emphasize the benefits through competitions:

- **Motivation** – For many participants, the interest in the subject generated by the playful engagement in the context of a competition translates quite easily into a deeper interaction with STEAME (Science, Technology, Engineering, Arts, Mathematics, Entrepreneurship) subjects in general.
- **Talent Discovery** – For many future scientists, early participation and success in mathematics competitions is the first step into a professional career in the area. The future innovators and creators are those who are capable of solving new non-standard problems and not just repeating known mathematical processes.
- **Precision** – The careful solution of problems shows the importance of critical self-reflection and precision in the creative processes leading to an answer. This aspect is much clearer in the context of a competition than it often is in the classroom.
- **Interaction** – Communication is sometimes more important than knowledge. Participants in group competitions are motivated to discuss their ideas and results with their peers. This facilitates social interaction and the useful exchange of ideas.