

# Canadian Math Kangaroo Contest Workshop

Organizers:

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The First Canadian Math Kangaroo Workshop was planned for a long time. The event, generously supported by BIRS and PIMS, became a reality in November 2010. Math Kangaroo city coordinators from the Greater Toronto Area, Ottawa, Montreal, St. John's, Winnipeg, Calgary, and Edmonton as well as volunteers from Edmonton and Calgary attended the workshop. Also, there was one participant from a city intending to organize the contest in the future. Eleven presenters gave talks, two of them undergraduate students.

## 1 Overview of the Field

In 2010, the international Math Kangaroo contest involved over 5.5 million students and hundreds of mathematicians from 46 countries internationally. The 2010 Canadian edition of the competition was administered in Ottawa, the Greater Toronto Area, Edmonton, Calgary, Montreal, St. John's, Winnipeg, Sudbury, Langley, and Lunenburg. Almost 1200 students participated in the contest, and hundreds were involved in various training and learning activities prior to the contest day.

The Math Kangaroo outreach programs focus on providing students in the age range of 8 to 18 with the opportunity to experience and explore mathematics. The organization's purpose is to share the joy of mathematics with youth through an annual math competition and short-term and year-long training opportunities. Since joining the International Association in 2006, the Canadian Math Kangaroo is continuously seeking ways to further expand its geographic reach and its high-demand unique programs.

## 2 Recent Developments and Open Problems

The Canadian Math Kangaroo program contributes to the science, engineering and education communities through its activities that revolve around the contest but go far beyond its organization.

- Practice sessions and math clubs provide opportunities for school children to explore and expand their math and logical skills in a non-competitive environment; they inspire and promote interest and excellence in math and science. More than 500 students per year receive training.
- Math Kangaroo engages university students; they gain a valuable experience by volunteering in the preparation and delivery of the training, as well as in the supervision and marking on the contest day.
- Canadian Math Kangaroo provides professional development for teachers and educators; workshops at professional conferences enhance their knowledge in the field of challenging mathematics.

- The math outreach educational materials developed through Canadian Math Kangaroo help teachers and parents to reach each student and address individual strengths and learning styles.
- Universities benefit from the students' visits on campus; they organize recruiting and promotion activities, simultaneously with the CMKP activities.
- Canadian Math Kangaroo activities not only promote mathematics; they build confidence and inspire further interest in math and science. Moreover, they build a sense of community and provide enjoyable experience to everyone involved.
- Canadian Math Kangaroo activities are family-oriented. Parents and older siblings volunteer during the training activities, participate in the informal parents' contest, and enhance their own knowledge and appreciation about science through numerous activities such as lectures by university professors on science topics, science presentations, and engineering summer camps, etc.

The Math Kangaroo contest is unique to Canada. Students can participate in it independently of their home school's involvement. It is one of the very few math contests available for Canadian elementary students. While the reputation, the merit, and the quality of inspired learning are at a very high level, the atmosphere on the contest day is unique compared to most of the other contests. Students get the chance to be in real university classrooms; the friendly and welcoming space is enhanced by snacks and small presents; the content is not boring (in fact, the Math Kangaroo is considered a contest-game because of the intended fun element of the problems). Last but not least, the competition allows international comparability of standards, which can be of interest for researchers in the area of math education.

The positive feedback Canadian Math Kangaroo organization receives from parents, students, teachers, and communities proves that its activities are in a high demand. Some of the needs merge with the broader call and need for increasing the overall mathematical, scientific, and technological literacy and skills of young Canadians. However, the most prominent need for the program is to correct the existence of a gap in the math and science outreach programs and activities for elementary students. The Canadian Math Kangaroo team believes in the benefits of exposing young school children to math challenges. This belief is in agreement with the leading educational and cognitive research in the field. Studies confirm that it is extremely important to start challenging these students at a younger age, "well before students reach the sixth or seventh grade" [1]. Delivering high quality year-long training programs across Canada, and providing students with opportunities to express themselves in competitive events and informal communications, significantly contributes to improving their analytical skills and helps them build confidence, which, in turn, motivates them to advance and to look for new challenges and goals.

### 3 Presentation Highlights

The workshop consisted of eleven presentations and several discussions on topics of interest to the organization and the workshop participants.

- **Valeria Pandelieva**, President: Opening remarks; current state of the organization in Canada; International sense and news; general information regarding the 2011 Math Kangaroo contest.

Valeria Pandelieva started with a brief history of the Canadian Math Kangaroo and its relationship with other similar organizations including the international organization "Kangaroo without Borders." The annual meetings of the international association are held every October in one of the member countries. Also, information in regard to the next year contest was provided to the audience.

- **Rossitza Marinova**, Finances: Financial matters, fund-raising information and initiatives.

Financial challenges the Math Kangaroo organization face were presented and discussed. The financial statements of the organization were reported. The presentation also included fund-raising initiatives recently taken by the Canadian Math Kangaroo. As well, a discussion took place on how to attract funding for local activities that are specific for the individual cities.

The planned activities and associated budgetary challenges were presented and discussed. These include:

- Canadian Math Kangaroo Contest;
  - Training activities: math clubs, practice sessions, online interactive training, local summer Math Kangaroo camps, international summer Math Kangaroo camps;
  - Expert support to broader professional educational communities: developing learning materials, professional development opportunities for teachers, research in math competitions and math education;
  - Promotional math and science-related activities for the general public: special sessions for bringing together interactive, hands-on science and engineering experiences.
- **Olga Zaitseva**, Problems Coordinator: Math Kangaroo as the first jump to Mathematics.  
Olga Zaitseva explained the way the contest problems are selected and edited. There are challenges associated with the French version of the problem sets that will have to be solved as soon as possible. Also, the presentation included the importance of organizing long-term training activities such as math clubs. Math clubs run for a long period of time and have a stand-alone curriculum composed of appropriate math enrichment topics. The math clubs are environments in which a greater depth and breath of the training can be achieved. Development of relevant materials for training is work in progress.
  - Next, the regional representatives gave 10-15 minutes presentations regarding the competition in their city. These presentations included: *Calgary (Mariya Svishchuk)*; *Edmonton (Rossitza Marinova)*; *Montreal (Ildiko Pelczer)*; *Ottawa (Todor Pandeliev)*; *Toronto (Sophie Chrysostomou)*; *St. John's (Margo Kondratieva)*; *Winnipeg (James Currie)*.
  - **Eddy Essien** presented the Website, in particular users' view and administrator's view; what is in place, what is coming, what will be good to have. The audience suggested better support to regional representatives to be provided through the Website, which include:
    - Bank of forms and templates to be created and made accessible from the administrator portal. New forms and templates to be added by all cities.
    - Bank with shared training materials to be made available.
    - Bylaws and instructions for regional representatives to be posted on the Website.
    - Pages for regional centres to be created and made accessible from the main Website.
    - Other technical details for improvement of the Website.
  - Another important presentation followed by a discussion was the club and contest organizational matters given by **Josey Hitesman**. This included how to recruit volunteers, positions, code conduct, and other business/management issues. It was decided that relevant materials will be provided to all participants and made accessible through the administrator portal.
  - The last presentation was about the IEEE Teacher In-Service Program (TISP) and the Math Kangaroo delivered by **Mooney Sherman**, the chair of the IEEE Northern Canada Section. Mooney Sherman introduced IEEE and TISP and also discussed some security and confidentiality issues.

## 4 Meeting Progress Made

Extensive discussion took place on how to do *marking and calculating the contest results*. Indeed, the Website and its functionality are important for assisting administrators.

It has been noted that there is a need for *more regular communication*; a forum could be used for this purpose. Of course, annual meetings are still needed; however, communications take place throughout the entire year, in particular during the period January - May.

*Promoting the contest and its accompanying programs* was discussed. It was made clear that the Canadian Math Kangaroo organization prefers to associate with academic institutions rather than organizations aiming

to promote their business through the competition. An outcome of this discussion was that some of the participants offered help in attracting new centres through universities.

The Canadian Math Kangaroo outreach programs aim to dispel the myth that mathematics is boring by creating a positive environment with fun events that emphasize the practical nature of mathematics. The IEEE TISP connections could be used for *joint activities of Math Kangaroo coordinators and IEEE volunteers*, example of which was the IEEE TISP Math Kangaroo project in Edmonton.

Ideas for inspiring *award ceremonies* were shared. For example, Edmonton and Calgary invite students to perform during the awards day which makes the day very special to parents, winners, other guests.

Exploring opportunities for *math clubs and summer math programs* would be activities of the local centres, which will be supported by the Canadian Math Kangaroo if funds are available. It is nice to see that lots of city started or plan to start math clubs in near future.

Organizing *workshops for teacher's and teachers candidates* on challenging math content was suggested. These workshops could be delivered during teachers conventions and conferences.

A plan for *development of materials for training* was proposed. Several workshop participants expressed interest in contributing to a series of math club materials that the Canadian Math Kangaroo will develop and publish.

*Research into students performance* is another aspect of the Math Kangaroo contest. This includes research in the field of math competitions and math education (e.g., conducting studies and presenting results to conferences and peer-reviewed journals). A discussion took place on how results can be used including privacy and confidentiality issues.

## 5 Outcome of the Meeting

The workshop is a significant milestone for the Canadian Math Kangaroo Contest organization. Representatives from various cities and provinces had their first meeting to exchange ideas and discuss issues.

The major meeting outcomes include:

- Groups were formed to develop online training program, math clubs and other training materials. Of course, existing materials will be shared among coordinators through the administrator's interface of the website.
- The sets of solutions from past three years (2008-2010) was distributed for editing.
- A small group worked on the selection of problems for the 2011 edition of the contest.
- Decisions were made on issues associated with the Website that will be implemented for the 2011 contest; others changes will be started and completed after the 2011 contest.
- Financial matters were discussed and budgetary specifics for the local centres.
- Holding workshops for teachers workshops on challenging mathematics and the ways to expose young students with diverse learning abilities to it.
- Organizing activities with the purpose to show how mathematics, science, and engineering are related through collaboration with other organizations such as IEEE Canada.
- Math Kangaroo centres are encouraged to organize local summer camps that will run for a week during the summer holidays, and will provide participants with rich instructional and problem solving experience, as well as with opportunities for socializing and communicating with other people of similar interests.

## References

- [1] Developing mathematically promising students, (L. J. Sheffield, ed) National Council of Teachers of Mathematics, 1999.