AKSF NEWSLETTER

Issue 2 - October 2021

Association Kangourou Sans Frontières

Hello and welcome to our second Kangourou sans Frontières Newsletter.

Joanna Matthiesen
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I am delighted to know that many of you read the first AKSF newsletter and enjoyed its content. Thank you to all AKSF members who helped with newsletter ideas and material. We are in the Fall season now and soon meet again in person or online at the annual meeting in Belgium.

This newsletter can reach anyone in the world and can be of a significant impact. However, the primary reader and beneficiary remains the AKSF members. There is a growing need to explore and share ideas on Math Kangaroo happenings, and I hope you can help. These topics are of a special interest to many Math Kangaroo members:

- How do you proctor Math Kangaroo students in a safe, legal, and non-invasive way?
- How do you promote Math Kangaroo in your country in a measurable way?
- What incentives have you used successfully to increase Math Kangaroo participation?
- What are the lessons learned that we all should avoid when facilitating the Math Kangaroo competition?

Are you proficient with English and have an interest in contributing to future AKSF newsletters? I am still looking for AKSF native English speakers to join me on the editorial-advising committee. I would be delighted to collaborate with more AKSF members.

The AKSF organization makes an effort to advance the outreach of Kangourou sans Frontières throughout the world. Learning mathematics may change the way students think and help them observe how math is interwoven into the other disciplines they study.

Allow me to highlight one aspect of mathematics that underpins a subject of great interest to many mathematicians - chess. In November 2021, the great Magnus Carlsen of Norway - current FIDE World Chess Champion - will defend his title in a match with Russian challenger Ian Nepomniachtchi in Dubai, United Arab Emirates.

Most are aware that in the last 60 years, computer-computational power has been able to brute-force calculate methods in an attempt to solve the game of chess.

The possible numbers of games and positions in chess is extremely large, first estimated by Clause Shannon in the 1950s, who gave an estimation of the upper limit of possible moves in a 40-move (80-ply) game as 10^{120}. He further estimated the number of possible [legal] positions at roughly:

$$\left(\frac{64!}{32!\,8!^2\,2!^6}\right) \approx 10^{43}$$

In the 1990s, evidenced by the matches between Kasparov and IBM's Deep Blue chess computer, humans were still able to defeat or draw when playing the strongest computers in the world.

This is no longer possible in 2021, as computer engines and neural networks such as Stockfish and Leela Chess Zero are powered by increasingly efficient hardware and processors. Chess engines are currently used by humans today as teaching aids in preparation for openings, matches, and to evaluate optimal moves in given positions.

Domination by modern chess engines is rooted in the ability to compute millions of moves, nodes, and variations per second and thereby derive optimal lines for best winning chances.

As the table below demonstrates, after only ten moves, there are combinations of games defined and far beyond human ability to comprehend. Chess variations, or lines, may be analyzed in light of both computational and game-tree complexity to formulate the most advantageous move in any given legal position, however it is neither feasible nor possible for humans to accomplish this at such great depths.

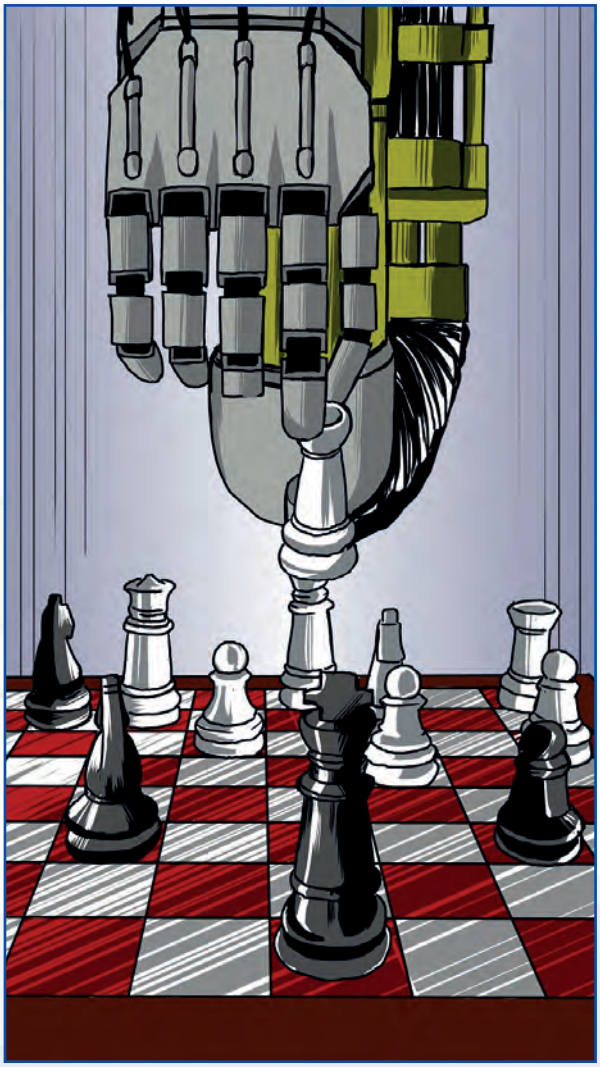
Number of plies (half-moves)	Number of possible games
1	20
2	400
3	8,902
4	197,281
5	4,865,609
6	119,060,324
7	3,195,901,860
8	84,998,978,956
9	2,439,530,234,167
10	69,352,859,712,417

> “As mathematicians we perhaps can appreciate these large numbers as they are studied in chess game-theory, and as they are played-out over the board by such modern chess Grandmasters.”

Wishing all of you a wonderful Fall and Winter Season. We plan to write again in the Winter/Spring season.

Any questions, suggestions, or concerns? Please address them to me directly, joanna@mathkangaroo.org. I hope to hear from you soon, and I welcome your feedback.

Sincerely yours in the Spirit of Math Kangaroo,
Joanna Matthiesen, M.S.
AKSF Newsletter Editor in Chief



News from The President

Meike Akveld
meike.akveld@math.ethz.ch

Dear Kangaroo Friends,

I hope you all enjoyed reading our first AKSF Newsletter and I am happy to write the "News from the President" for our second Newsletter. Well, what has happened in AKSF since the first Newsletter?

As you all certainly noticed, Matjaz relaunched our internal support site. An enormous amount of work was done by him, supported by, in particular, Alex, and also some other Board members. So, a BIG THANK YOU to all of them. As IT goes, there may still be some bugs. Please don't get annoyed or upset by them, but simply report them to Matjaz or Alex so that they can try to fix them.

Right now, we have many applicants which are all appointed a supervisor (usually a Board member that helps them set up Kangaroo in their country). Hopefully quite a few of them will become provisional members at the next Annual Meeting. Over the year, we receive many inquiries how to become a member of AKSF. Obviously, we are well known and popular. Nevertheless, I would like to encourage all of you to talk about AKSF with your contacts in Africa.

> "I would be ever so pleased if more African countries would join us, not only because I think what we are doing is wonderful and should be shared with as many children on the globe as possible, but also because I view Kangaroo as an opportunity. An opportunity to build networks and share materials, in your country, on your continent or throughout the whole world. I strongly believe that teachers in Africa would benefit enormously from this too."

Now having mentioned our Annual Meeting: The Board together with the Belgium team is working hard to prepare this meeting. Who would have thought last year, when we cancelled the Annual Meeting, that Covid would still be in the center of our discussions right now? Well, it is! And I guess it is all over the world. I just hope so much that the meeting in Belgium can take place. If it does, it will be a hybrid meeting, so different from last year. Some people will be present, some will be online, we need to accommodate for both, which means the organisation is going to be harder (and I thought last year was hard!). The Opening Ceremony and the General assembly will be truly hybrid meetings hosted by the hotel (thanks to the Belgium team for offering this), the work in the working groups will be organised via Zoom – like last year – which will mean that even the people present need to use their own laptop and headset. You will get more information and instructions.

And then there will be all the things we need to vote about, we already should have voted about last year and the postponed Board elections. For all this we will be supported by the hotel and again we will give you more details once we know more. One thing, however, is already clear; we will have Board elections and we need new Board members. As you probably all know the amount of work the Board is doing has grown substantially over the years. So, we are looking for people willing to take over part of this work and share the load. What do we offer? Well, experience in an international organisation and a wonderful team of people that share a common passion, namely mathematics and the joy of spreading this.

One other thing that I would like to mention. In May I "virtually" attended the International Bebras Task Workshop, which some of you attended too. I was invited as a guest and gave a presentation about Kangaroo. This was well received and there seems so be a genuine interest to exchange experiences and if possible, collaborate.

As was already announced the president of Bebras will be invited to our Annual Meeting (probably in Italy) and I will also be invited to their next meeting. I think it is important that we stay open and collaborate with organisations that pursue the same goals as we do, which is actually written in our documents:

Article 2:
§2.2 The Association will establish friendly relationships with other organizations or international associations having similar goals.

And that's it for now. I wish you a good time reading this Newsletter and I am looking forward to seeing many of you in Belgium or in our online meetings.

Take care and stay healthy!
Yours,
Meike Akveld
AKSF President

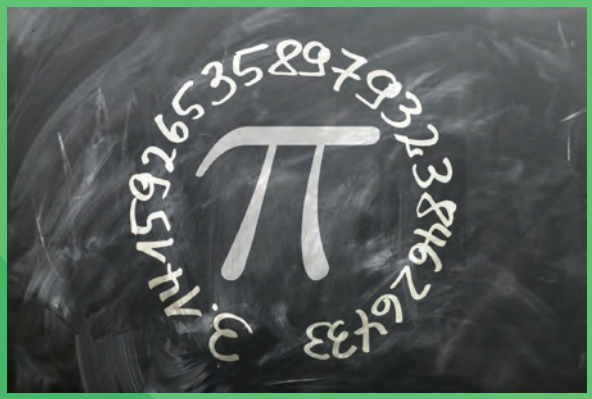
Math World

Bogazici University Mathematical Sicences Center

Seminars and research presentations of graduate students are held at the Istanbul Mathematical Sciences Center located on the Boğaziçi University Campus:

http://imbm.org.tr/index-en.html

Swiss Researchers Declare New Record for Exact Pi Figure



Swiss researchers said Monday they had calculated the mathematical constant pi to a new world-record level of exactitude, hitting 62.8 trillion figures using a supercomputer.

https://bit.ly/3zUWcoL

A Mathematician Won an Olympic Gold Medal in Cycling

Austrian mathematician Anna Kiesenhofer won the gold medal in women's road race cycling on Sunday. Kiesenhofer holds a doctorate in applied maths.

https://on.wsj.com/3kUtyjh

World Logic Day

January 14 was the anniversary of the birth of the famous logician Alfred Tarski. The date, which is also the anniversary of Kurt Gödel's death, has been officially celebrated as World Logic Day since 2019. As befits this special day, many universities organize seminars in the fields of logic and philosophy of mathematics:

https://wld.cipsh.international/wld.html

XXIX Meeting in Belgium

Bart Windels
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Although COVID-19 still has large parts of the world in its grip, Antwerp is preparing to welcome as many AKSF members as possible for the XXIX Annual Kangaroo Meeting from Wednesday 3rd November 2021 to Sunday 7th November 2021. After reopening registration in September, it became apparent that not everyone will be able to travel to Belgium. Therefore, the 2021 Kangaroo meeting will be hybrid.

Online participants follow the Session for Special Projects, the Opening Assembly and the General Meeting via Zoom, while the in situ participants follow these meetings together in a large hall. Everyone, regardless of whether you are an online or an in situ participant, can equally participate and contribute to the meetings. An external tech partner will organize the voting online, securely and anonymously, and under the watchful eye of the Board Election Committee.

The work in the working groups will take place entirely via Zoom. The in situ participants Zoom together in small groups, but each with their own device. This will work smoothly if everybody keeps their microphone muted (unless you want to speak) and if all in situ participants use a headset.

The programme of the meeting can be found at

www.ksf2021.be

17th century Antwerp City Hall by night (photo taken from the tower of the Cathedral of our Lady)

The logo of the XXIX Annual Kangaroo Meeting in Antwerp just had to be a diamond. In the end, Antwerp is the diamond capital of the world: 85 % of the world's rough diamonds, 50 % of the polished diamonds, and 40 % of the industrial diamonds pass through the city. Antwerp has been the largest and most dependable diamond centre in the world since 1447.

We didn't just choose some ordinary diamond. The logo depicts the so-called Tolkowsky diamond, also known as The Ideal Cut. It was designed in 1919 by the young Belgian math student Marcel Tolkowsky. He was 19 years old when he wrote a math thesis on the optimal proportions for round brilliant cut diamonds. To this day, the resulting 58-facet stone is regarded to be an optimal trade-off between brilliance, fire and sparkle. Moreover, since $58 = 2 \times 29$, a 58-facet diamond is quite suitable for the 29th Annual Kangaroo Meeting. The colours in the logo represent the five colours used in the problem booklets of the Belgian Kangaroo.

But Antwerp has more to offer than diamonds alone. The city is an atypical metropolis that innovates at the speed of light. Despite its relatively humble proportions, it boasts the second biggest port in Europe and its vast offering of cultural, professional and culinary delights is enhanced by over 175 nationalities. Shopping boutiques, museums, the historical home of Rubens and the world's biggest diamond trade hub are all within strolling distance of each other. Nightlife is vibrant too, with plenty of theatres and more restaurants and bars than you can ever visit in your life.

The Rubens House, the home of the 16th-17th century painter Pieter Paul Rubens

More details about the Kangaroo meeting, including the programme and important travel information can be found at www.ksf2021.be.

Antwerp skyline by night

We very much look forward to welcoming you in Antwerp, online or in situ.

The organizing committee of ksf2021.be,

Bart

Joke

Koen

Loes

Ria

Bart Windels
Organizer

The Election Year of the AKSF Board Members

Gregor Dolinar
gregor.dolinar@fe.uni-lj.si

The AKSF Board guides the long-term goals and policies of our organization by making strategic plans and decisions. Serving on the AKSF Board carries various responsibilities and a significant time commitment. At the same time, it can be a very rewarding experience. I would like to share with you some thoughts about my journey as a board member and president of the AKSF.

Slovenia organized the sixth AKSF annual meeting in 1998 and at that meeting in Slovenia I was invited to join the AKSF Board. I agreed and have remained on the board ever since until 2019.

At that time, in 1998, our organization AKSF was still very small, more a group of colleagues and friends from 23 countries who shared their enthusiasm about a very beautiful idea, namely, how to popularize mathematics. In those years there were not many precise rules or procedures to follow, it was still possible to discuss anything with anyone. In the beginning, we had a board meeting once a year that lasted an hour or two during the annual AKSF meeting, and there was no business that was handled by the board between two annual meetings. And it was not until the early of the 21st century that we began to hold proper board elections.

As our organization grew, of course, more and more business had to be taken care of, so in recent years there have been two board meetings, in the spring and in the autumn, that have lasted several days, and there have also been many issues to deal with throughout the year.

> “Working in the board was a real joy for me in all those years. Sharing the different ideas and views of board members from around the world and then uniting them through constructive debate and dialog to find good solutions for our organization has definitely been fulfilling.”

I am sure that there are many members in AKSF with excellent organizational skills who have different responsibilities at their home institutions and have various ideas how to make our organization even better. I would say that working in the board and getting some international experience is for sure worth trying.

Let me mention also that when in 2010 I was elected for a president and then serving my three terms until 2019, AKSF was facing many different challenges, some of them quite difficult. It would be completely impossible to face those challenges without help and hard work of the other board members, for whom I am extremely grateful.

At our 2021 annual meeting in Antwerp we will have board elections. It is a fact that the president cannot do all the work alone. Therefore, it is important that Meike has an excellent team to work with, members of the board from different parts of the world and with different backgrounds. I hope that we will have many excellent candidates for the board who are willing to give some of their time to AKSF and share their experience so that our organization AKSF can continue to thrive and provide excellent math problems to millions of students around the world.

Gregor Dolinar

The Art of Making Kangaroo Problems

Kirsten Rosenkilde
kirstenrosenkilde@gmail.com

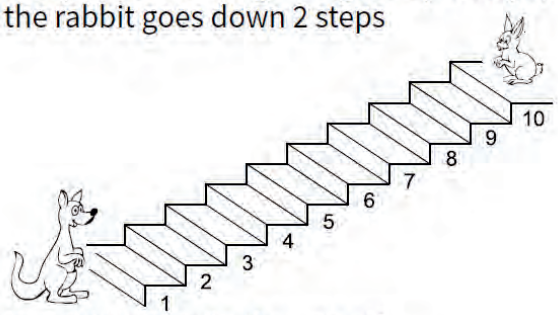
The heart of the Kangaroo is our wonderful problems which inspires millions of children around the world, and the quality of these problems depends on the collaboration of many people in many countries working with math education at many different levels. My impression is that the work of making problem proposals for Kangaroo is done very differently and that we could learn a lot from each other, so here is how we do in Denmark.

We are five people who meet for a five-hour meeting where we develop the problems. Each of us brings ideas for problems; some ideas are already well formulated as a problem, and some are vaguer. We discuss the ideas, and very often the ideas change and together we make a better problem. An example is the problem from 2020 with the kangaroo and the rabbit. The general idea was to have a kangaroo at the bottom of a staircase and a rabbit at the top who each jumps a fixed number of steps at the same time and ask at what step they would meet.

We played with the numbers and in the end, we ended with an easy version for Preecolier with 10 steps shown at the picture, so the contestants were actually able to simply draw at the picture to solve the problem, but hopefully still get a feeling of the math implied, and a harder one for Ecolier with 100 steps. In Ecolier we still thought that the picture was important to visualize the problem, and also letting the picture contain some of the information, here the number of steps. At this age it is still hard to read too much information, but much easier to digest if it is visualized.

Preecolier 2020

Every time the kangaroo goes up 3 steps, the rabbit goes down 2 steps

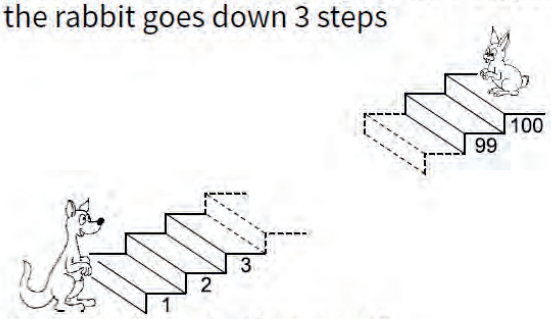


On which step do they meet?

3 4 5 6 7

Ecolier 2020

Every time the kangaroo goes up 7 steps, the rabbit goes down 3 steps



On which step do they meet?

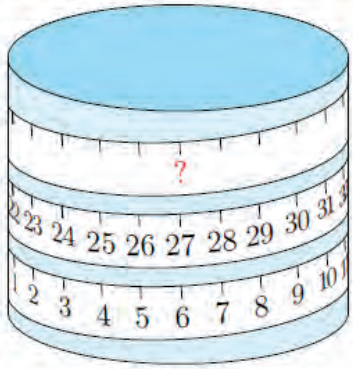
53 60 63 70 73

We only have Preecolier, Ecolier and Benjamin, and in these categories, it is important to have good pictures. We also know that we always lack good 3-point problems at the Kangaroo meetings, so we make an effort to find good 3-point problems. For the small kids we try to make problems where the picture shows everything.

An example is the problem with the measuring tape wrapped around a cylinder from 2021. Here we agreed that it would only be a good problem if we could draw a picture that made the situation very clear. We also thought a lot about what numbers to choose to make it realistic, but also very easy to calculate. The result is seen here, and I am sure a lot of kids solved it without reading the text.

Ecolier 2021

A measuring tape is wrapped around a cylinder.



Which number should be at the place shown by the question mark?

33 **42** **48** **53** **69**

If we have an idea that we cannot turn into a problem we think has a good chance of being elected, then we discard it, even after a lot of work. After our meeting we also use time making good pictures like for example the one with the measuring tape before we send the proposals.

We have a checklist that we use in the process and also in the end:

- At what level is this a good problem?
- Can the problems be solved within the curriculum?
- Would the problem improve if we change the numbers, shapes, ...?
- Could the four wrong answers be improved?
- Is the picture optimal, or could we improve it? What information is going to be at the picture?
- Do we really want the problem to be in the final problem set, or should we discard it?

Kirsten Rosenkilde

Kangaroo's Math Contest as an engaging experience in Brazil during the pandemic

Prof. Élio Mega
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Just like every other country, Brazil was also taken by surprise by the arrival of the COVID-19 pandemic a few days before the official Kangaroo's application day, in 2020. And unfortunately, there was no time to organize the contest in March as planned. Each school was taking its own decision on when or if to close and the students were sent home without any support or orientation.

As we realized that the Brazilian government was failing to address this problem and that the schools would be closed for a very long time, we started debating if we should implement an online version of the Kangaroo contest. Very powerful conversations happened inside our team and between us and the contest´s participants that helped us to reflect what was our role in all of this.

We've being having an experience of growth in the number of participants since the beginning of the contest, in 2009, from approximately 30% a year and we knew that the pandemic could have serious consequences on this numbers.

So, on one hand, we never had organized online contests like that before and it seemed a great challenge in a country the size of Brazil and with its inequalities.

On the other hand, we believed that we should hold on to our mission of bringing a challenging, fun and different mathematics to as many students as possible and in those difficult circumstances, that could have been more important than ever. Schools and teachers needed all the help they could get to bring interesting content to millions of students staying and studying home.

With all that in mind, we decided to face this daring challenge by modeling a contest as inclusive as possible considering our country's problems on technology access, both to schools and to students/families. We decided to, in these special circumstances, privilege access and engagement and this was our main goal – enchant students with math in such difficult times.

Alongside with planning the contest we decided to intensify our interaction with our students and teachers via e-mail and via social media. We started to publish more math content, questions, challenges, studying material and math curiosities, hoping that this could help teachers and students fill any possible void in their contact with Math.

For the contest to happen, we knew that decentralization was the key and we had to count on the teacher´s and school's partnership and should train them on how to conduct an online contest with their students, leaving our own staff as support for that.

We developed our platform to support millions of simultaneous accesses and prepared a series of training, tutorial videos and written material for the teachers and their students, so they could participate without major difficulties.

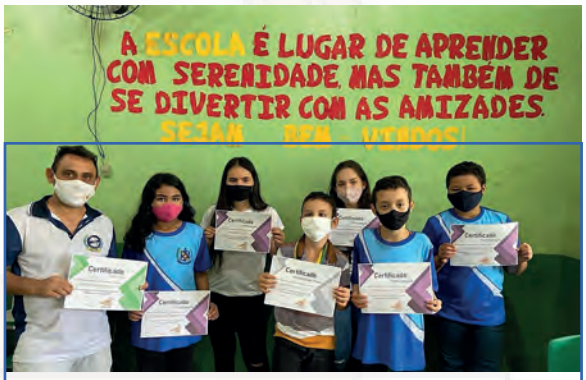
Also, we changed the awarding criteria. Rather than a national competition, we established a per school competition. We thought that a national competition in this adverse context would not be fair. It is important to mention that we have a great variety of school profiles, from private schools - which serves a privileged social economic class - to indigenous or rural public schools of very poor cities.

Exceptionally, we structured two contests in 2020 to give them opportunity and time to adapt and prepare. One version of the contest took place in June and another in September totaling almost 280,000 participants. Both were relatively successful without any major problems. There was one thing that surprised us. Without the obligation of printing the tests (paper and ink costs), some public schools preferred the online model to engage a larger number of students.

In 2021, with schools, teachers and students better structured for remote learning we saw a larger participation of more than 400,000 students, a significant increase compared to 2020.

The contest took place in March, at the official dates and 96% of the schools evaluated the online experience as good or excellent. In terms of access, unfortunately there were 897,000 enrolled students but only approximately 400,000 participated.

Certainly, the online model is not perfect or even ideal for Brazil. Far from it. It is more difficult to control and prevent frauds and/or restrain any unethical behavior from schools or students, we had profound social problems pertaining to technology access and we had to deal with a huge number of support calls on the application days.



> "But also, it showed us a community of schools, teachers, students and families committed to the math learning process which confirmed to us how the Kangaroo contest is an excellent experience of engaging students in a different, fun and interesting math, much more than a performance evaluation where only results matter. Our community was able to perceive us as an opportunity to learn more and better math and for that, even facing big day to day challenges, they have accepted our invitation to be a part of this daring and huge event."

For more statistics, data, photos of the Contest in Brazil go to:
www.cangurudematematicabrasil.com.br
https://instagram.com/cangurudematematicabrasil

Prof. Élio Mega
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Cristina Diaz
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Coming Math Relates Events

EVENT 1

EUROPEAN STEAME CONFERENCE

29-30 October 2021

www.steame.eu

This is an event of the European Funded project STEAME: Guidelines for Developing and Implementing STEAME Schools and will be hosted in Cyprus. The conference invites presentations of STEAME related developments from researchers and practitioners. FREE REGISTRATION. The STEAME project will present the STAEME School of the Future. Limited funding is available for local and international participants. More information about application for co-funding, participation and exact location can be found soon in the site www.steame.eu. This is a physical event.

For information write to info@steame.eu

EVENT 2

EUROMATH 2022

11-16 March 2022

www.euromath.org

The 14th EUROMATH conference for school students is planned to take place in Thessaloniki, Greece, during 11-16 March 2022. Students make presentations and can participate in 10 different competitions during the event. Teachers and professors offer workshops to school students. You can see previous editions and coming calls by visiting www.euromath.org. This is a hybrid event.

For information write to info@euromath.org

Graphic design and mathematical storytelling in the context of the Catalan Mathematical Society Cangur

Marta Berini
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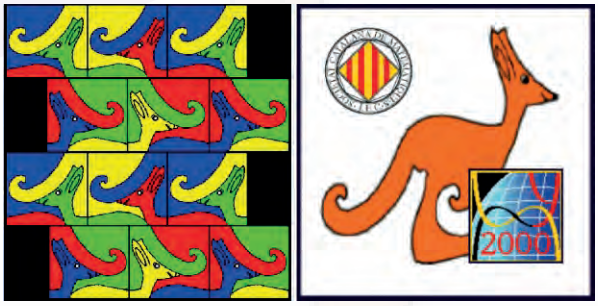
In 1995 the Catalan Mathematical Society (SCM) became aware of the association named Le Kangourou sans frontiers (AKSF) and the organization of an annual game contest, initially known as Le Kangourou des Mathématiques. This was due to the friendship and collaboration in other aspects with Professor Francisco Bellot, a Spanish member of the AKSF. As surely happens with many of the readers of this publication, we saw it immediately with great interest; we did a survey in high schools and, given that we received extraordinarily favorable opinions, in '96 the Kangourou contest (named "the Cangur") was born in Catalonia, on a trial basis, with 1,313 participants in the 15-17 age group.

By the fourth year, participation in the Cangur had almost quadrupled: every year more schools became aware of the proposal (with communications still by post) and participated in it; the SCM was recognized as a member of the AKSF to develop the Kangourou contest in the Catalan language and, as the year 2000 approached, which was named the World Year of Mathematics, all this led to the practice of novel ideas.

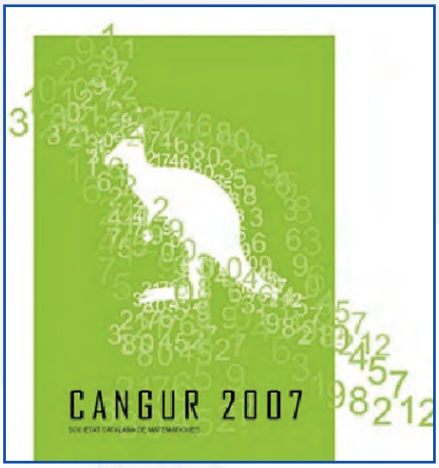
First of all, the geographical scope of the Cangur was extended to the other autonomous communities that have the Catalan as a co-official language (the Valencian community and the Balearic Islands) and this idea has been consolidated with three "sister organizations": within the framework of the SCM, with the collaboration of local mathematical associations and some variants in the organization.

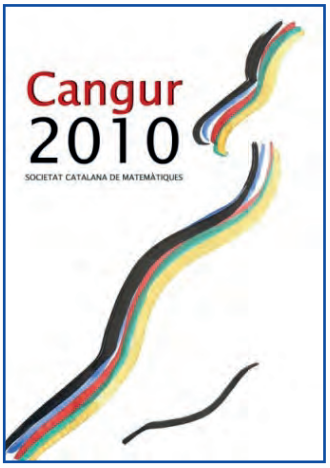


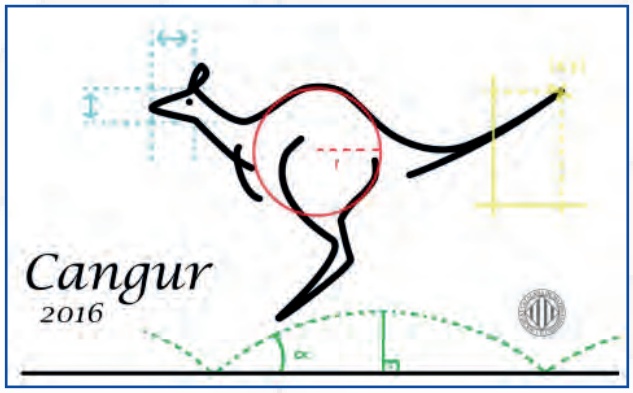
During the 20th century, the posters displaying the SCM-Cangur were variations of the AKSF's own logo (Raoul Raba design).

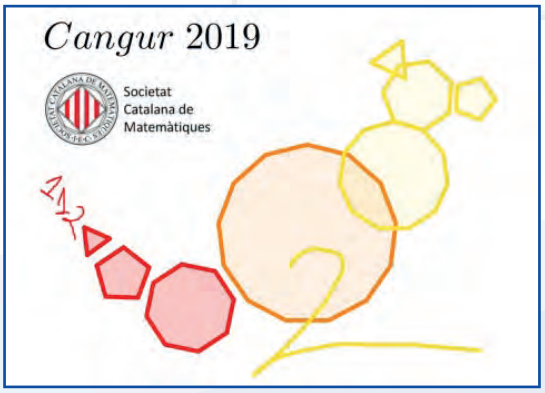
> "However, as a complement to the contest of year 2000, the management committee announced a competition among boys and girls in the 15-18 age group for the design of the identification sign for our Cangur. The idea crystallized and since then, triennially (or in some cases biannually) a contest is called resulting in very valuable participation. The approach of each design is free, with the only condition that it must incorporate, of course, some graphic reference to the Kangourou and the indication, graphic or textual, that the game contest is an activity of the SCM."

You can see complete information at https://www.cangur.org/cartells and below we show the winning posters of the 8 contests held.









A mathematical storytelling contest was also considered. There was some debate about the appropriateness of this second interdisciplinary activity but, finally, in the context of the 2005Cangur-SCM, the call was made for the first contest of storytelling related to the world of mathematics. It has been held every year uninterruptedly, with the 17th edition in the year 2021.

The jury values the works considering the literary and formal quality (style and narrative clarity) as well as the originality of the story, and especially how the mathematical aspect and the contribution of information have been treated. According to the rules (https://www.cangur.org/relats) ,the stories must be written in the language of the lands where people say "Bon dia"(i. e.bonjour, good day...) and it is interesting to comment that there have been award-winning stories written in the four fundamental dialectal variants in the geographical area that in the AKSF is designated as Catalonia (Eastern Catalan, Western Catalan, Valencian and Balearic) that all philology departments around the world recognize as the same language. The overall assessment and the quality of the finalist stories of the activity and those stories that have been awarded are very positive.

As a sample for this Newsletter, we have selected the winning story of the 2017 contest, written by Sílvia Casacuberta Puig, then a student in the penultimate year of secondary education and currently an undergraduate student in Mathematics and Computer Science at Harvard University.

The author has been kind enough to translate it into English and you can find it at https://www.cangur.org/relats/relats2017/inequalities.pdf.

We encourage you to read it. Here you will find a nice reflection on numbering in base 2.

As everyone knows, in 2020 the Kangourou organization suffered a setback, like so many things in our lives around the world. But in Catalonia we were happy because these two activities could be carried out successfully and, in a way, kept the flame of the Cangur-SCM burning.

This was also helped by other activities that complement our Cangur: the online contests "Sprint problems" for school center teams (which we presented in detail at the 2006 meeting and which is called at four different levels); individual telematic contests ("Marathon on problems", with two different levels of the activity, and which may be the subject of a future article in another Newsletter), and the "Telecangur" (https://www.cangur.org/telecangur) that we presented at the 2020 tele-meeting.

To conclude this collaboration, we would like to explain that in 2021, in the geographical area of Catalonia, despite the very special conditions in the day-to-day operation of the schools (due to the health standards of the pandemic) there were more than 93,000 participants in the Cangur-SCM contest. In the very first year 1,313 students in the 15-18 age group participated; in 2021 the age range has doubled, because now the proposal is aimed at ages 11 to 18, but the number of participants has multiplied by more than 70. (!!!).

We think that these complementary activities that we have presented help to make our Kangourou/Cangur more important in the environment of AKSF, Le Kangourou sans Frontières.

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Storytelling with Math Kangaroo Problems

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In this article, I want to explain more about the storytelling league with Math Kangaroo questions. The experience of holding such an activity was a new and pristine one, the very raw idea of which was proposed a few years ago. It had been a few years since the idea of turning multiple-answer Math Kangaroo questions into interactive activities was discussed within the Iran Math Kangaroo, particularly for age groups 1 and 2 (PreEcolier). The idea of "writing a story" – a story that deals with Math Kangaroo problems – was combined with the overall proposition. The result was an 8-day league in May 2021 in which each participating student answered 1 to 3 problems per day in one of the following formats:

- Puzzle
- Imap
- Short Answer
- Multiple (5) Answer

The pre-requirement for participating each day was to answer the previous day's problems correctly. On the eighth day, the student received a file containing all the problems of the previous seven days and was able to upload his story, which must have been between 100 and 1000 words.

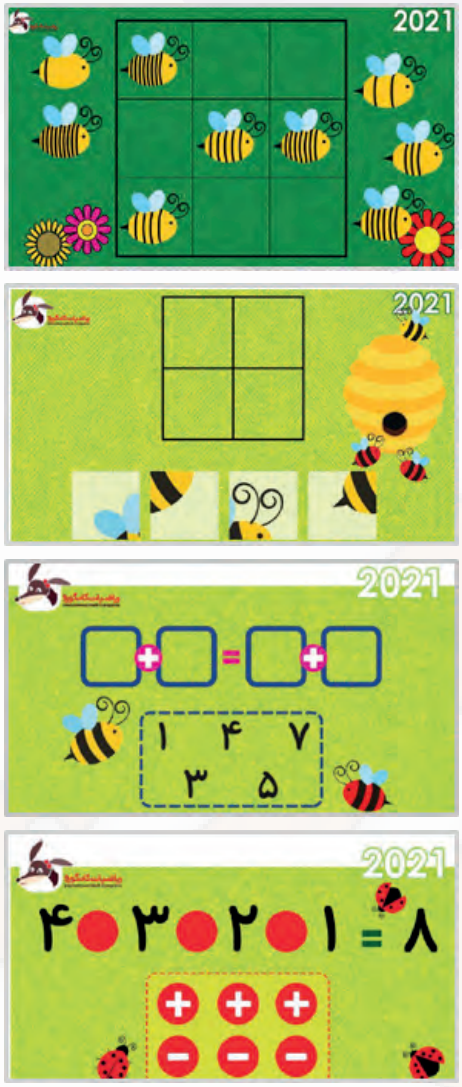
Well, this is what the activity looks like: for 7 days, solve one to three problems each day on the interactive platform; to solve some problems, you might want to grab the images with your finger or the mouse and drag them to where you think is the right place; or to solve some others, you might click or tap on the images or texts or numbers to select the correct one. And for a few, you either write a number in the blank space or click on the correct option. In short, interact with the problems on pages with happy colors and beautiful images.

On the eighth day, create a story with the same problems that you have been involved with for those 7 days; real or completely fictional story!

But behind the scenes of this happy and fascinating childish mathematical-literacy activity were days of thinking and working to get it ready to use. First of all, for hours and days, I have been searching among the problems of the PreEcolier, Ecolier, and Benjamin groups over the last five or six years; a search that was a memory lane of the meetings I also attended and played a small part in selecting the problems. This multiple-time review was to find common real or imaginary contexts, similar characters, and the possibility of turning each problem into one of several interactive activities and categorizing them in a way that for instance, among the Ecolier problems, two sets of problems are obtained, one suitable for third-grade students and the other suitable for fourth-grade elementary students. Although it seems easier to do the first two, finding common ground and similar characters for the storytelling competition, the fact is that all four had to be done at the same time.

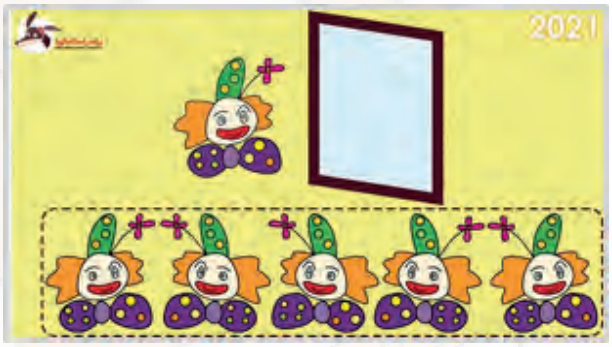
> “Because, first of all, it should have been possible to turn each problem into an interactive format, so that its mathematical nature does not change and in some cases, the number of possible cases to answer would be limited and the technical possibilities of the platform would also allow me to build that problem.”

Finally, the following six backgrounds and personalities were selected for the six age groups, and I determined the problems I wanted and even arranged them to be fit in seven days, so that they have a fairly coherent process and, as the saying goes, would be relevant enough to have a "story" told in their heart. I must say that I also had to change some problems to match the atmosphere and characters of the other ones:



- In the first elementary grade: The common space is a garden, and the ladybug is often the main character, accompanied by the butterfly and a few insects.
- In the second elementary grade: The main character is often a bee accompanied by some insects and events take place in different spaces.
- In the third elementary grade: The common space is a house and its different parts, and the characters of the problems are children, and all that is asked in the problems are related to doing something at home.
- In the fourth grade of elementary school: toys and a land of toys are the subjects of the problems.
- In the fifth grade of elementary school: Different animals are the characters of the problems, and a magic garden is the space of the problems.
- And in the sixth grade: Problems related to food and fruits and spaces such as the kitchen are selected.

Re-illustration was done on all problems so that they were attractive and eye-catching. The students welcomed the league, and a number of participants also did the storytelling section and sent it to us.
Most students' topic was "answering questions"; that is, the characters in their story, who were, for instance, in the first grade a ladybug and in the second grade a bee, "went through adventures by answering questions." We expected some students to make up fictional stories with problem locations and characters.



In final words I may add that bringing Kangaroo problems on an interactive platform is a need and a new way to attract students to mathematical problem solving. Storytelling is also a vital lifelong communication skill that fosters the growth of logical thinking and developing relations between objects. In our effort to support the acquisition of math concepts, we also look to storytelling curriculum and technologies as a source of inspiration.

Sepideh Chamanara
Iran Math Kangaroo
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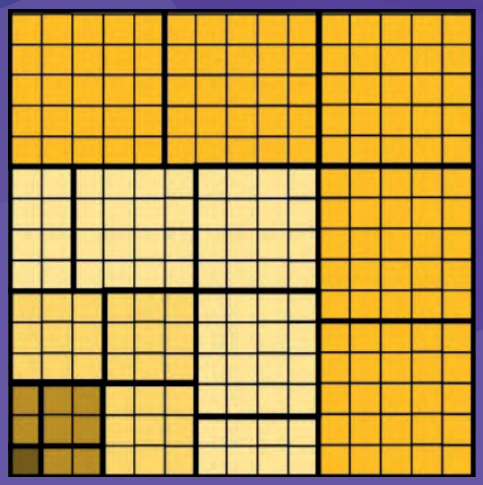
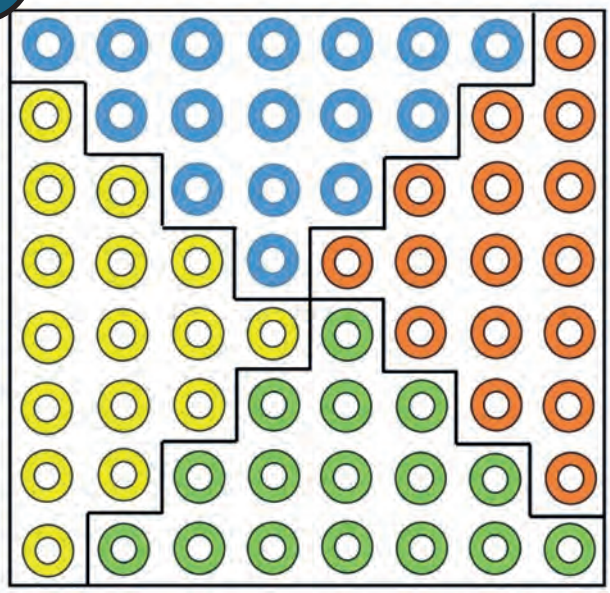
Proofs without Words

1



$1^3+2^3+3^3+\ldots+n^3=(1+2+3+\ldots+n)^2$

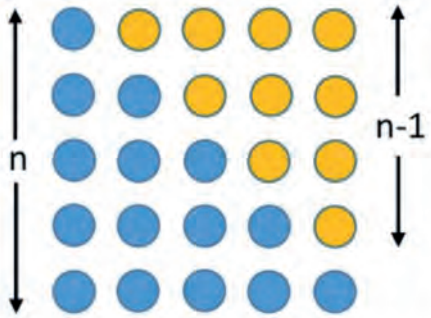
2



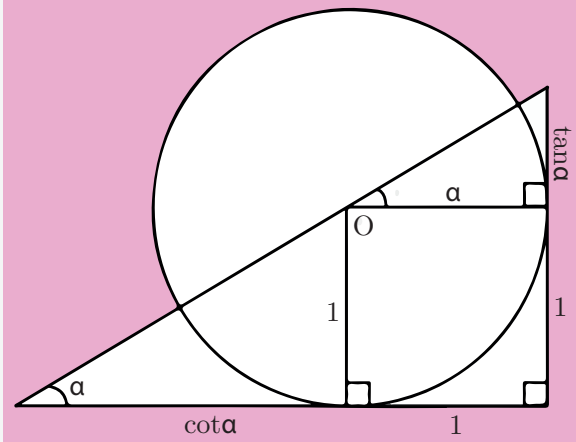
$$1+3+5+7+\cdots+(2n-1)=\frac{(2n)^2}{4}=n^2$$

3

$$\binom{n}{2}=\frac{n(n-1)}{2} \Rightarrow \binom{n}{2}+\binom{n+1}{2}=n^2$$



4



$$\tan\alpha=\frac{1+\tan\alpha}{1+\cot\alpha}$$

Kangaroo's Impact on Teachers and School Life

Özgür Özdemir
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Is it just a contest?

What makes the Kangaroo Math Challenge so effective and indispensable: Kangaroo questions. So why? The answer to this question may not be easily given. In fact, the beauty of some questions can only be understood by those who have a certain background in mathematics. But it is a fact that Kangaroo Mathematics questions have an impact on our schools and teachers, considering the segment they reach. It is normal for a competition that aims to attract students to the pleasant world of mathematics with impressive questions, because the aim is to influence. So how do we see this effect concretely?

I'm sure every country, and perhaps every individual, has different experiences and memories of the Kangaroo's effects. But these effects are most easily and mainly followed by schools and teachers. Those who add color to the lessons through kangaroo problems, those who decorate their classrooms with kangaroo questions or student clubs opened under the name Kangaroo... All these are the tangible effects of Kangaroo Mathematics. But besides these, the most important effect is in an area that is not so clearly observed: the change in curriculum and teaching methods.

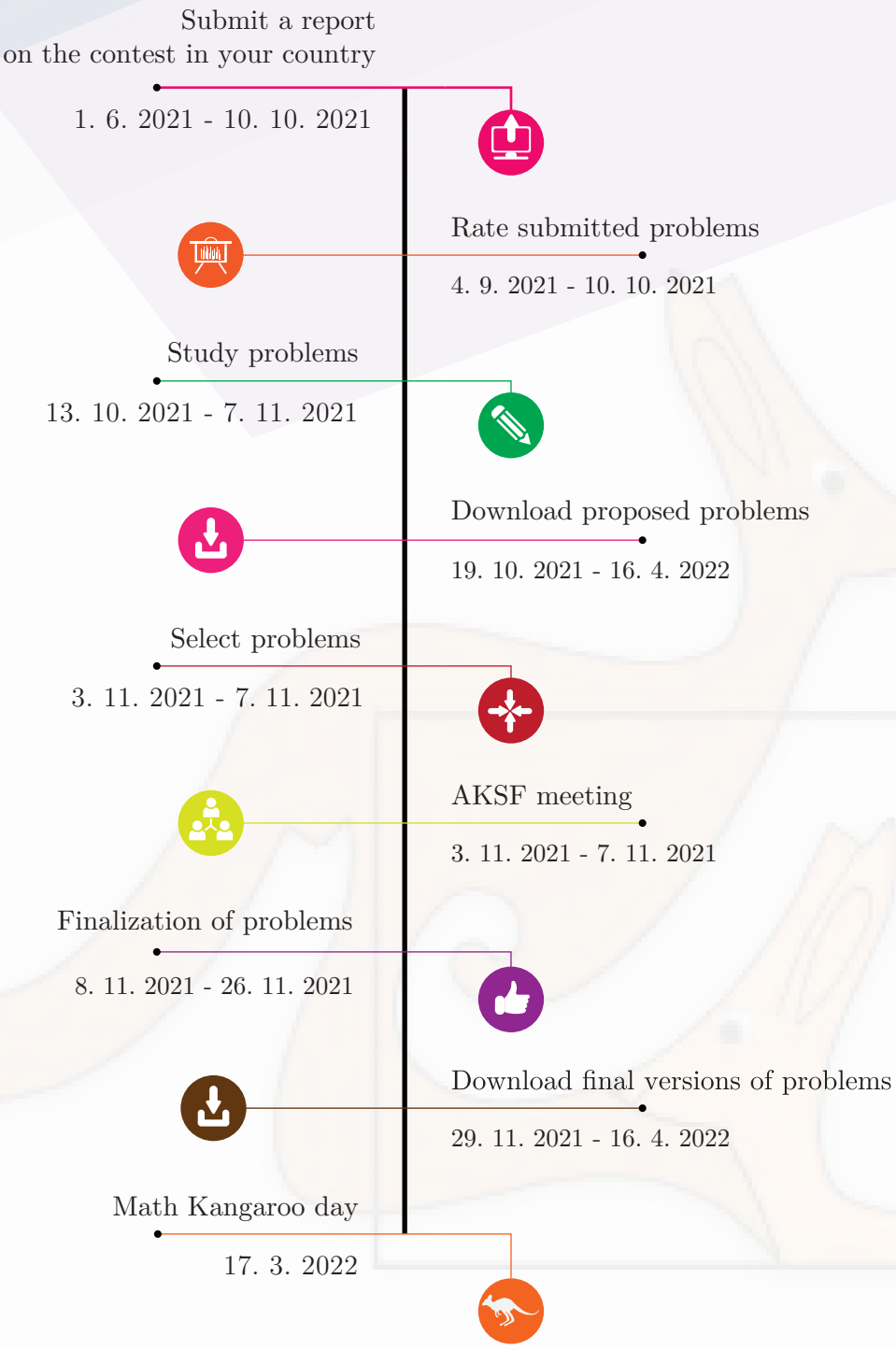
Schools and teachers began to organize Kangaroo lessons or activities for their students. Kangaroo problems, on the other hand, usually have the ability to affect people who come into contact with them in certain ways. Especially Kangaroo problems, which are not based on rote and which people solve by researching or having to develop some methods, arouse a unique pleasure in the person. Problems that attract you due to their ties to daily life inevitably create an effect that triggers your mathematical thinking.

> "Teachers or schools, who closely observe these effects, organize lessons or activities in which questions similar to Kangaroo problems are solved in order to improve their students' mathematical and intellectual skills. In fact, most of the time, instead of rote-based methods in lessons, a more scrutinizing method with more detailed connections is adopted."

In our country, we can directly see the effects of Kangaroo on mathematics lessons, teachers and even publications. Some schools, which have an important place in the field of education, can open a Kangaroo Club for their students after school. Or experienced teachers use these questions in their lessons by researching Kangaroo problems for their students. In fact, private Kangaroo lessons can be opened outside of school. Publishers try to produce questions similar to Kangaroo problems in their books and they indicate this on their book covers. There are many more examples, but it is clear that Kangaroo Math is much more than a competition.

That is why the most important thing for the Kangaroo family, which creates this effect, which cannot be created by rules or laws, naturally and by acting spontaneously, is the shine in the eyes of a child dealing with Kangaroo problems.

Özgür Özdemir


Submit a report
on the contest in your country
1. 6. 2021 - 10. 10. 2021
Rate submitted problems
4. 9. 2021 - 10. 10. 2021
Study problems
13. 10. 2021 - 7. 11. 2021
Download proposed problems
19. 10. 2021 - 16. 4. 2022
Select problems
3. 11. 2021 - 7. 11. 2021
AKSF meeting
3. 11. 2021 - 7. 11. 2021
Finalization of problems
8. 11. 2021 - 26. 11. 2021
Download final versions of problems
29. 11. 2021 - 16. 4. 2022
Math Kangaroo day
17. 3. 2022