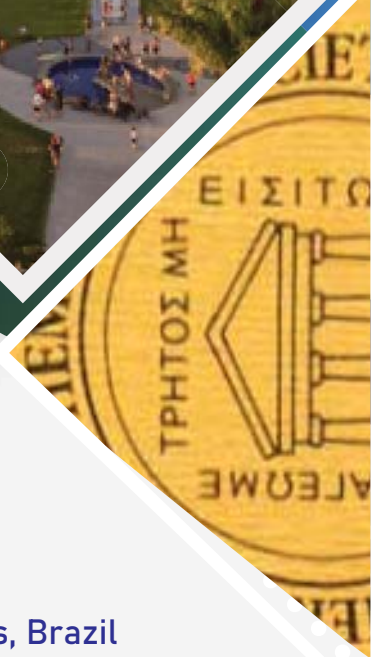


Issue 10  
July 2024



Association Kangourou  
Sans Frontières



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## *Hello and welcome to our 10<sup>th</sup> Kangourou sans Frontières Newsletter.*

Dear Kangaroo Friends,

I am happy to write in our 10<sup>th</sup> edition of the newsletter. Time flies and so many great articles have been published over the last few years. Our organization is growing, and more and more countries are joining. We are all fascinated by the interesting activities we do for our students in our own countries. There is so much to discover when collaborating and sharing our experiences. I encourage you to read each article in this newsletter as all are worth your full attention.

What else is new? I have been involved with the Mitsubishi Electric Research Labs, Cambridge, MA, as well as Massachusetts Institute of Technology, Cambridge, MA in studying the applications of Artificial Intelligence (AI) in the United States among those testing such avenues vis-à-vis math problem solving. Overall, the results show that modern LVLMs demonstrate increasingly powerful reasoning skills in solving problems for higher grades but lack the foundations to answer correctly problems designed for younger children. Further analysis shows that there is no significant correlation between the reasoning capabilities of AI models and that of young children, and their capabilities appear to be based on a different type of reasoning than the cumulative knowledge that underlies children's mathematical skills.



Joanna Matthiesen  
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While still in development, AI has not reached its potential, and its intelligence is not as good as the human brain. So, for now, we can safely say, even a 6-year-old student beats the AI brain. I plan to share with you the complete studies and the research paper in the next newsletter edition.

Wishing all of you a wonderful summer. We plan to write again in September. Let me know as soon as you can if you have a topic to bring to my attention as I graciously await new ideas and interesting proposals. Remember your article proposals don't have to be long: 2 pages or up to 700 words is plenty. The deadline to submit articles for our Fall edition is September 1.

*Joanna*  
**AKSF Newsletter Editor in Chief**



## *News from The President*

M e i k e   A k v e l d

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Dear Kangaroo friends,

Spring has arrived in many parts of the world, on others fall has started – it shows once again how widely spread our Association is – we cover the whole globe.

I hope that we can all look back on a successful Kangaroo season or are still in the middle of it. In this article I would like to report about the following three issues:

- The Spring Board Meeting in Istanbul
- The upcoming Annual meeting and in particular the Board elections
- The General Assembly where we will decide about many members, who have been a provisional member for three (or four) years now. The question will be whether we want to make them full members or whether we should perhaps look for a different partner.

### **The Spring Board Meeting**

For the third time in a row now the Turkish Kangaroo has been so generous to organise the Spring Board Meeting of AKSF in Istanbul. Here I would like to thank Özgür and his team for their wonderful hospitality. We had three very intensive Board Meetings over the past three years, did lots of work and saw three different parts of Istanbul. Thanks!

At the Board Meeting we discussed, besides the usual topics, at length about how to streamline the work of our Treasurer in a better way so that we can make this not very nice job a little less cumbersome. We have some ideas; we will see what will work out and here I would also like to ask for your collaboration. If all of us simply

stick to deadlines and do what we should do, then we make Robert's life a lot easier. Don't forget he does this on a voluntary basis, which I am very grateful for, so we should all try to help and simply do our duties. Another idea is to appoint an Assistant-Treasurer – you will soon hear more about this. Perhaps you, or someone in your team is interested?

Another point of discussion was sponsoring. Do we want to be sponsored, should we have sponsors, and if yes, under what conditions? We will report more at the Annual Meeting. We also discussed how to keep communication in our ever-growing community good and transparent. This is not easy, and it is important. We will try to re-introduce some short presentations at the Opening Meeting, we also have the Newsletter for this reason, and we try to think of more. Any ideas are welcome.

### **Board Elections**

The Annual Meeting 2024 will see a Board Election. In my role as president, I will not be directly affected as the next president election will be in 2025. Nevertheless, it is extremely important to me to have a functioning board. Without that we could not run an Association as big as ours. As you are probably aware the current Board is a very friendly group of people but also an extremely efficient and hard-working group of people – that's why we get so many things done.

A few things are important to me. We need to look into the future, we need continuity and for that we need new Board members that can learn about the current things and then take them further. So, we do need constant change. I also really would like to see some diversity. We are a worldwide organisation, and this should be represented in the Board. Diversity is more than geographic variation; I want a group of people representing all of us in all sorts of ways. Please consider whether being a Board member might be something for you, or whether you think so-and-so would be the perfect person for the AKSF Board. Besides from doing some work, being in the Board is an interesting experience, one learns a lot about international organisations and gets to work with an inspiring group of people.

### **Provisional → Full Member**

Remember that we changed the definition of a provisional member in 2021 in Belgium. This will first come into action this year as we need to decide which provisional members will become full members and which will not (and thereby lose their membership).

In short, we have done the following: It has now become much easier to get the status of provisional member. This both helps our new members as they have an official status in our association which may help them get support in their country and it helps us. It was what our lawyers recommended when we revised our Statutes: The status of applicant, which no duties and no rights, was legally not one that they recommended, and they warned that it could cause troubles. This has been changed with the revision of the minutes in 2021. It also gives us as an association a clear moment in time where we decide if we want to continue with an entity or not (in the past it was very hard to deal with members that did not follow the philosophy of AKSF). After three years the

Board can decide to propose a provisional member to become a full member and if this is granted by the General Assembly the provisional member changes status. If this is not granted or if this is not proposed than the provisional member automatically loses membership. Note that it is then possible to re-apply again. In particular in the case of countries that may take more than three years to set up the Kangaroo competition successfully this may still be a good way to follow the development. We hope that this way only entities will be proposed to be full members, in which the Board has full confidence. They have been supervised for three years by a Board member and the development has been monitored closely. The Board then checks both all membership duties are fulfilled, and that the competition develops in the spirit of AKSF: Kangaroo is about popularisation of mathematics – we want all children to participate and ways to achieve this should be demonstrated.

Alex Unger has written a very detailed and clear article in this Newsletter. I strongly recommend you read this as it explains all the details you need to know in order to be informed at the next General Assembly.

**Take care and stay healthy!**

**Yours,  
Meike**

**AKSF President**

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[http://facebook.com/aksf.org](https://http://facebook.com/aksf.org)

## *XXXII Annual KSF meeting in Santos, Brazil*



*Santos at sunset*

Dear KSF members,

We are delighted to invite you to join us in Santos, São Paulo, Brazil this October for another celebration of our incredible journey together.

This marks the third annual KSF meeting in the Americas, and the first one in the Southern Hemisphere. I'm sure many of you are looking forward to this event. While Brazil might seem exotic to some, you'll find Santos quite familiar, aside from the charming palm trees, delicious feijoada, and refreshing caipirinha.

Santos is renowned for many things, including Pelé, football (or soccer, as some call it), and coffee, the main export of Santos port. If you're adventurous, consider exploring the Northeastern region or the Amazon, which offer a more exotic and pristine experience, even for Brazilians. Planning these trips requires careful consideration of flights, accommodations, and other logistics.

Some members are already planning to visit Bahia or other northeastern states with their families, explore the landscapes, and then attend the meeting in Santos, while their families return home. Other fascinating destinations include the Pantanal in Mato

Grosso, Iguaçu Falls (currently experiencing flooding but expected to improve by October), and Minas Gerais, known for its colonial cities and renowned cuisine.



*Santos beach*

In Santos, we have a busy schedule ahead. Our Brazilian team is working diligently to ensure your comfort. We'll be staying in a quality hotel that caters to both our work, food and lodging needs. Early birds can enjoy the pool or a morning walk on the nearby beach, with pleasant temperatures around 24°C and hopefully sunny days. The hotel's ground floor features a mall with both well-known brands and local handicrafts. The area boasts numerous restaurants and a vibrant nightlife for those seeking an adventure.

For your meeting, please fly into Guarulhos (GRU) airport, the primary airport in the São Paulo metropolitan area. We won't provide transfers from other airports like Congonhas or Viracopos, so please avoid these options.

For visa information, review the links sent with your invitation letter. If you have any questions or need assistance, feel free to contact us or consult our website

<https://www.ksf2024.com.br/>



We eagerly await your arrival, ready to extend the best of Brazilian hospitality. We are confident that our community will once again come together to create wonderful and impactful math problems for Kangourou Contests worldwide. From our side, we are happily expecting to reach more than 1.5 million Brazilian students with the Kangourou Contest in 2025.

See you soon!

Warm Regards!

The Brazilian Team

<https://www.ksf2024.com.br/>



*Brazilian Kangourou medalists*

## *New full members in AKSF*

A l e x a n d e r   U n g e r

unger@math.hu-berlin.de



At this year's General Assembly many provisional active members will be proposed to become full active members. And some may not. As the definition of "provisional active member" changed in 2021, this article tries to outline the procedure and the exact requirements for provisional active members in order to become full active members of our association. All our members should have a clear picture in preparation of the voting at the General Assembly at this year's Annual Meeting in Brazil.

The current number of provisional active members is quite large. Our association gained many new members in the past years and we did not admit new members in 2020 where the COVID-19 pandemic made it too hard to judge on the applicants. The change of the definition of "provisional active member" in our By-laws in 2021 had several goals as were described in the Agenda of the General Assembly 2021 in Antwerp. The admission procedure for both the members and our association should become more transparent, more predictable and simpler to handle. Also, organisations who run the Kangaroo competition and have access to our resources should have a clear status in order to provide some security for our association and to help those organisations with obtaining support from authorities in their countries ore easily. The status of provisional active member was limited to 3 years, and after that a provisional active member is either granted full

membership upon proposal by the Board or automatically loses membership (see our By-laws, article 4.1). The strict limit of 3 years is to give other entities with decent plans the possibility to apply for membership if the competition does not develop well or as quickly as we hoped for under the current member. The 3 years of provisional membership shall not be extended unless very exceptional circumstances like a nature catastrophe or a war had a major impact on the respective country and made it impossible for the member to organise the competition or to reach further development.

This year we will decide on the membership status of the provisional members that were granted membership in 2021, i.e. from the following 15 countries: China, Egypt, Georgia, Hong Kong, Indonesia, Iraq, Jamaica, Cambodia, Kuwait, Montenegro, New Zealand, Palestine, Thailand, Republic of China (Taiwan) and South Africa (from the 16 countries in consideration after last year's General Assembly, our member from Algeria resigned in January 2024 and thus lost membership according to our By-laws, article 5.2).

From our regulations the admission procedure is deduced as follows:

**1.**At the spring Board meeting which took place in Istanbul from 9 to 12 May 2024 the Board carefully checked for each provisional active member all formal requirements and the assigned supervisors reported on the development of the competition in the respective country (see below). Based on this information the Board decided for each provisional active member to either propose them to the General Assembly to become a full active member or not.

**2.**Each provisional active member was informed of the decision immediately after the spring Board meeting.

**3.**In the agenda of the General Assembly, the Board will announce

**a.**the provisional active members who will be proposed to the General Assembly to become full active members along with some general reasoning, and

**b.**the provisional active members who will not be proposed to the General Assembly to become full active members along with some individual reasoning.

**4.**All members of AKSF may send questions to the Board as soon as possible before the Annual Meeting.

**5.**As announced in the agenda, the Board will propose provisional active members to the General Assembly to become full active members and the General Assembly will decide by secret vote. Provisional active members that are not proposed to become full active members will not be mentioned at the General Assembly and automatically lose membership.

Formal requirements for provisional active members to become full active members are the fulfilment of the membership duties deduced from our Internal Regulations, articles 3 and 4. Each member of AKSF must

**1.**organise the Kangaroo game contest on the official Kangaroo day or possibly later;

**2.**submit question proposals until 31st August for next year's Kangaroo competition; to give our provisional active members a chance to learn about the competition it is considered in line with our regulations if a provisional active member submits proposals at least once in the 3 years;

**3.**pay the annual subscription fee; note that provisional members that became provisional members in 2021 are obliged to pay the full fee;

**4.**hand in a complete report including copies of each problem set used in their country;

**5.**attend the Annual Meeting; in order to respect financial and organisational difficulties that many of our provisional members face it is considered in line with our regulations if a provisional active member attends the Annual Meeting at least once in the 3 years;

**6.**regularly present their plans for the future development of the Kangaroo game contest in their country to the assigned supervisor.



Please be aware: If a provisional active member does not fulfil one of these membership duties, it will not be proposed by the Board to the General Assembly to become full active member.

Besides these formal requirements, provisional active members must show that they act in the spirit of AKSF, try to reach its goals as much as possible – in particular its main goal to popularise mathematics – and fulfil the membership duties to the most possible extent. There should be a clear positive development of the Kangaroo competition in their country. Possible criteria for development of the Kangaroo game contest are:

1. The numbers of participants should grow.
2. The numbers of participants should be significant in relation to the country's population.
3. The member should make active attempts to offer the contest to all interested students; not offering the competition for all levels, all parts of the country or all school types in the beginning may help to get the competition established and is thus considered in line with our regulations.
4. The provisional member should try to reduce barriers which could prevent students from taking part as much as possible; for example: a participation fee should be affordable for most students; the problem sets should be offered in an official language, possibly more than one.
5. The provisional member should have established necessary means or networks in order to promote the competition to the schools or individual students as much as possible.
6. The provisional member should show obvious interest in contributing to our

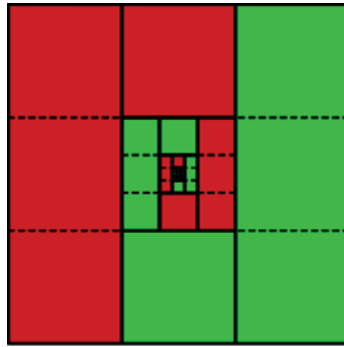
community, and communication with the assigned supervisor should be easy and reliable.

7. Mathematical know-how and pedagogical skills in the provisional member's organisation should suffice to prepare the problem sets and other material correctly and considerate of possible contradictions to national curricula.

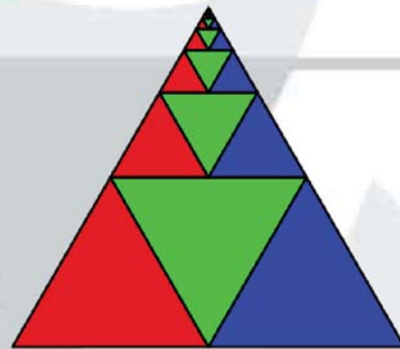
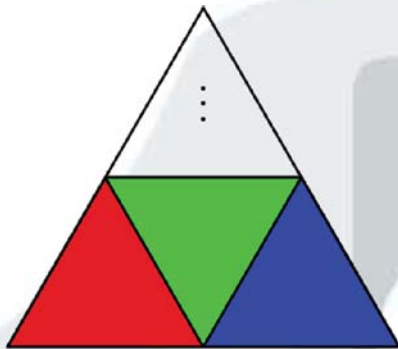
Clearly, some of these criteria are hard to assess. The Board will try to gather as much information as possible and provisional members should provide as much as possible. If in some country no clear development is visible, the provisional active member will not be proposed by the Board to the General Assembly to become full active member, in particular if some other candidate is known who is estimated to develop the competition better. If no other candidate is available, the provisional member that loses membership can immediately re-apply to become a provisional member and so gain another three years to show better development. This should be possible without any interruptions of the competition in the country.

The Board is looking forward to a smoothly running voting at the General Assembly at this year's Annual Meeting in Brazil – and of course to our new full members!

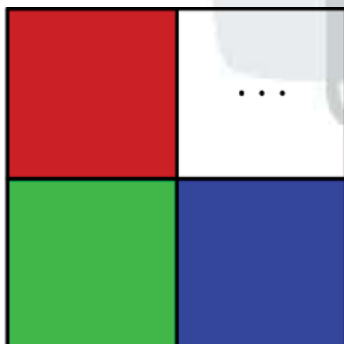
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## *Scripta Manent*

*The purpose of this column is to discuss, periodically, proverbial phrases from philosophy, literature or history that are relevant to Mathematics. In each case, we explore the origin, meaning, and use of maxims which mathematicians and intellectuals often like to refer to.*



Michael Lambrou

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### **Tangum ex ungue leonem**

The proverbial phrase **Tangum ex ungue leonem** is the Latin rendering of the corresponding ancient Greek metaphor "**ex onychos ton leonta**", which translates as "we know the lion by its claw".

The meaning of this is that we may infer that something is important or valuable based on limited information. In other words, we may elaborate on an unassuming or humble observation and then move beyond the surface to a deeper interpretation by recognizing the full potential of a situation.

Although the origin of the phrase **Tangum ex ungue leonem** has no direct relevance to Mathematics, it became proverbial, at least among scientists in the Latin West, because of a delightful story involving two prominent mathematicians, the Swiss **Johann Bernoulli** (1667-1748) and the English **Isaac Newton** (1642-1726). Very briefly, but more on this below, Bernoulli posed a difficult problem as a challenge to the mathematical community of Europe. One of the solutions to the problem came from London through the Post by an anonymous author. However, when Bernoulli studied the solution he was flabbergasted by its brilliancy and concluded that the anonymous author could be none other than Newton. At this

point, he exclaimed that one solution was sufficient to recognize the author much the same way as one may recognize the size of a lion by its claw: **Tangum ex ungue leonem**.



Johann Bernoulli



Isaac Newton



The phrase **Tanguam ex ungue leonem** was not original with Bernoulli but was known and used by scholars before him, especially by the great Western Humanists who were well-versed in ancient Greek literature. As a matter of fact, after the invention of printing most significant Greek works were translated into Latin or the vernacular languages and became part of the education of all intellectuals. That includes texts that contain this particular phrase. Let us then see the story of the original Greek version of the proverbial phrase we are discussing. After that, we shall return to the Bernoulli-Newton incident and elaborate on its details.

The origin of the phrase “**ex onychos ton leonta**” is attributed **Alcaeus** (625-580 BC) who was one of the important early Greek lyric poets, contemporary with the great poetesse, **Sappho**. Unfortunately, most of Alcaeus’s poems are today lost with only fragments remaining. The phrase itself is not found in any surviving fragments but it is cited by several later authors who attribute it to Alcaeus. For example, it is quoted (see section 419d) some 600 years later in the essay “**De defectu oraculorum**” (“**Peri ekleloipoton hristirion**” which translates to “On the cessation of oracles”) by the great historian, biographer, philosopher and essayist, **Plutarch** (45-120 AD). For the economy of space, I omit the details here but only mention that Plutarch’s extensive works have been well-studied by scholars and classicists since the Renaissance times.

More interesting is a short anecdote by **Lucian of Samosata** (125 –180 AD), a Syrian novelist, satirist and rhetorician whose works, all written in Greek, were widely popular in antiquity and a large portion of which survives today. They are all a delightful reading. Lucian’s “**Hermotimus or On Heresies**” (“**Ermotimos i Peri aireseon**”, paragraphs 794-795),

mentions the sculptor and painter **Phidias** (480 – 430 BC) who, alongside **Myron, Praxiteles, Polyclitus, Scopas, Lysippus** and others was one of the outstanding artists of antiquity. For example, he decorated the Parthenon, designed the Statue of Zeus at Olympia which was one of the Seven Wonders of the Ancient World, and designed the colossal bronze statue of the goddess Athena on the Acropolis (the statue of Zeus is today lost but there is a smaller reproduction of the statue of Athena). According to the story, someone commissioned Phidias to draw a painting of a lion. When Phidias asked to see the lion as a model on which he could base his painting, the commissioner could only show him a nail from the said lion’s claw. This, Phidias replied, was sufficient because an artist should have the imagination to estimate the whole from its parts, quoting the phrase we are discussing.



**Desiderius Erasmus**

Notice it quotes a minor variant of the original in the sense that it says “you can **estimate** the (size of a) lion by its claw”, but let us come to the Bernoulli-Newton story.

In 1696, Johann Bernoulli challenged the mathematicians of Europe to solve two difficult problems one of which involved the shape of “the curve of fastest descent”. Namely, given a point A and a lower point B, not directly below A, what is the shape of the curve on the vertical plane connecting the points if a bead that slides on it under the influence of gravity and without friction would take the shortest possible time to move from A to B?

This was later named the **brachistochrone curve**, from the Greek words brachistos (shortest) and chronos (time). It turns out to be a cycloid, and the theory behind it evolved to become the Calculus of Variations of Euler.

The Challenge of Bernoulli was published in the major mathematical journal **Acta Eruditorum**, 18, page 269, in June 1696 under the title **"Problema novum ad cuius solutionem Mathematici invitantur"** (A new problem to whose solution mathematicians are invited.) The exact wording, which I leave in its Latin form because it is easily understood, was

*"Datis in plano verticali duobus punctis A & B (vid Fig. 5) assignare Mobili M, viam AMB, per quam gravitate sua descendens & moveri incipiens a puncto A, brevissimo tempore perveniat ad alterum punctum B."*

The wording of Bernoulli's challenge to the mathematical community, in translation from Latin, was

There are several other mentions of **“ex onychos ton leonta”** in classical Greek literature (which I will bypass) whence it became well known in Western Europe. For example, it was included (with a minor variation) in a monumental book of Proverbs by one of the leading humanists of all times, a man with an immense influence on Western culture, the **Dutch Desiderius Erasmus** (1466 – 1536). His book entitled **Adagia** (first printed in 1500 but saw many editions and expansions ever since) is an annotated compilation of over 4000 Greek and Latin proverbs. It is a cornucopia of information. I include the first few lines of Adage (proverb) “Leonem ex unguibus aestimare” (paragraph I. 9. xxxiv) in Greek (the first six words) and Latin so you can see the flavor of the text.

*Ek ton onychon ton leonta gignoskein, id est **Ex unguibus aestimare leonem**, est ex una quapiam conjectura negotium universum perpendere, ex paucis multa, ex minimis maxima conjicere. Natum videtur adagium a Phidia statuaria, qui, sicut narrat Lucianus in Haeresibus, inspecto leonis dumtaxat ungui quantus esset totus leo perpendit totumque ex indicio unguis effinxit...*

*I, Johann Bernoulli, address the most brilliant mathematicians in the world. Nothing is more attractive to intelligent people than an honest, challenging problem, whose possible solution will bestow fame and remain as a lasting monument. Following the example set by Pascal, Fermat, etc., I hope to gain the gratitude of the whole scientific community by placing before the finest mathematicians of our time a problem which will test their methods and the strength of their intellect. If someone communicates to me the solution of the proposed problem, I shall publicly declare him worthy of praise...*

Bernoulli allowed six months for the solutions but none was submitted in this period. The time, at the request of Leibniz, was extended for a year and a half. The extension of time was printed in a text entitled "Programma", was published in the Netherlands and was dated 1 January 1697.

This is how Newton's niece, Catherine Barton, later Conduitt, describes how Newton learned of the challenge and how he responded: 'Sir Newton was very busy with the mint and returned home at four in the afternoon; he felt very tired, but did not go to bed until he had solved it, which he did at four in the morning.' (Keynes manuscript, 130151, King's College Library, Cambridge). The next day, 30 January 1697, Newton sent the solutions to the president of the Royal Society, **Montagne**, who forwarded them, without the name of the solver, to Bernoulli.

Bernoulli, writing to Henri Basnage in March 1697, mentioned that even though the author of the solution, "by an excess of modesty", had not revealed his name, yet from the scant details supplied it could be recognized as Newton's work, "ex ungue Leonem."

The details about the story of the exclamation of *tanquam ex ungue Leonem* were collected by the scientist and historian David Brewster, **Memoirs of the Life, Writings and Discoveries of Sir Isaac Newton** (1855), a work which took more than 20 years' of investigation of original manuscripts and extensive study of all available bibliography

Finally, five mathematicians supplied solutions: Leibniz, Tschirnhaus, l' Hôpital, Jacob Bernoulli (one of the brothers of Johann) and Newton. Four of these solutions, those of Leibniz, Tschirnhaus, Jacob Bernoulli and Newton, were published as consecutive articles at *Acta Eruditorum* immediately after Johann Bernoulli's own solution. Newton's solution was anonymous and a reproduction of his solution (also anonymous) published at the *Philosophical Transactions of the Royal Society* of January 1697.



On May the fourth (also known as Star Wars Day - May the Fourth be with you!), AKSF offered an online workshop with the title "Preparing good proposals". Three talks were given by Alexander Unger (Germany), Dennis Ho Christiansen and Kirsten Rosenkilde (Denmark) and María Luisa Pérez Seguí (Mexico), all of which have a history of great success in problem proposals for our competition. Over 100 participants from all over the globe took part in the live stream, with more watching the recorded version!

If you haven't had a chance to participate, here it is:

## The workshop recording

## The workshop slides

Because of the great success, similar workshops may be offered in the future. If you have a good idea for the topic of such a workshop, please do not hesitate to suggest it to the Board!

### The cake problem



#### Possible maths tasks

- ▶ What ratio has been eaten?
- ▶ What angles do the pieces have?

#### Adaptation

- ▶ Hide an angle  
→ easy angle problem but not obvious

**Final proposal (2024, Cadet 4 points, selected as #11 & Student 3 points, selected as #3)**

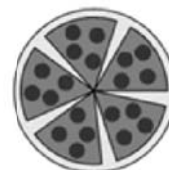
**18: #19112.** Carina baked a cake and cut it into 10 equal pieces. After eating one piece, she arranged the remaining pieces evenly. What is the size of the angle of each gap?

- (A)  $5^\circ$       (B)  $4^\circ$       (C)  $3^\circ$       (D)  $2^\circ$       (E)  $1^\circ$



**32: #19126.** Matteo cut a pizza into 6 equal pieces. After eating one piece, he arranged the remaining pieces evenly. What is the size of the angle of each gap?

- (A)  $5^\circ$       (B)  $8^\circ$       (C)  $9^\circ$   
(D)  $10^\circ$       (E)  $12^\circ$



## *Help Needed*



### 1.The Treasurer's Assistant needed

Would you like to be involved in volunteering and helping our organization run smoother?

Our treasurer is looking for some help with simple record keeping work. This position will require a commitment of 20-30 hours per year. Help would be appreciated producing invoices and receipts for members, as well as contacting members about outstanding payments or other finance issues. Desired skills needed for the job: patience and a friendly demeanor, working in MS Word, written English skills. Skills NOT required: a financial degree or knowledge of accounting.

(Note: The position will not include access to the AKSF accounts.)

Here is **A FORM** to apply.



### 2.Social Media Person in charge needed

Did you know we have a Facebook page? Please visit our page, like it and follow it!

<https://www.facebook.com/aksf.org>



Would you like to be involved in helping to run our page, make it more creative, vibrant and active? If you are on social media often and would like to add this page to your list – this would be helpful. Providing voice and content for our AKSF association could involve posting some information, responding to comments, creating content and keeping up to date with trends on social media.

Please contact Joanna if you would like to help with this important task for our organizational visibility.

## *The Kangaroo Mathematics Contest: Fostering Unity in Israel*

Prof. Mark Applebaum  
mark@kaye.ac.il



The Kangaroo Mathematics Contest in Israel is celebrated for its inclusive approach, inviting participants aged 7-16 from both Hebrew and Arabic-speaking communities. This competition is distinguished by a preparatory phase that utilizes the Moodle platform, a globally recognized educational tool. Over 16 weeks, participants tackle approximately 150 mathematical problems sourced from past contests. Each week unveils eight new problems that students must solve sequentially, starting with the simplest and escalating to more complex challenges.

In Israel, every student accesses the certified educational platforms with a unique password provided by the Ministry of Education, ensuring a personalized and secure learning experience. Within our program, the Moodle platform not only hosts the contest but also automatically evaluates all submitted solutions. After completing the problems, students can access videotaped solutions in both Hebrew and Arabic languages, facilitating a deeper understanding of the methods involved. Each correct answer not only bolsters the student's confidence but also contributes points to their final score, which constitutes 10% of their overall result. The remaining 90% is derived from their performance in a comprehensive final test.

The contest's website integrates gamification elements to further engage students, enabling them to advance through five levels of expertise, ranging from "novice" to "expert". This interactive and dynamic approach has proven to significantly boost motivation among participants. The integration of contest scores into final school grades by some educators, and the development of peer mentoring programs where older students guide their younger counterparts, have fostered a supportive and collaborative community.





Several regions have raised the stakes by transforming the contest into a city championship, conducted in two phases with the culminating round held face-to-face, administered by official contest organizers.



Even amidst the challenges posed by ongoing conflicts in which Israel has been involved, the contest proceeded uninterrupted during the 2023–2024 academic year. This resilience underscores the deep commitment of both Jewish and Arab communities to this educational endeavor.

Remarkably, half of the members of the Israeli Kangaroo team are educators from the Arab community, which mirrors our collective ambition to champion mathematics across diverse cultural sectors. The number of Israeli Arab participants has seen a consistent uptick, culminating in 2024 with over 1600 Arab students participating out of more than 6840 contestants. The increasing engagement of Arab students is a testament to the contest's role as a bridge, transcending societal and cultural divides through the universal language of mathematics.

This contest not only highlights the unifying power of mathematics but also serves as a beacon of cooperation and mutual respect across different segments of Israeli society, demonstrating how academic competitions can foster a shared sense of community and pursuit of knowledge.

## *The Teams play the game*

A n g e l o   L i s s o n i

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In the last 15 years, Kangourou Italia has organized team competitions in addition to individual competitions. Actually, we offer five competitions: Ecolier Cup, Benjamin Cup, Cadet Cup, Junior Cup and Student Cup.

This year (2024) two moviemakers have created a video to be distributed in schools of all levels. I have sent this video to Meike and Luis and got responses: “Wow! + You have to write an article for the Newsletter + I have the impression that the competitors had a lot of fun.” In my opinion, the remark about fun is correct and significant. The video will be linked to this article. However, let me first explain what the team competitions are.

- The teams are assembled by 7 students from the same school.
- They are presented with a given number of questions (usually between 12 and 15) whose answers are non-negative integers of 4 digits or less.
- Each team provides its answer to the single question or by delivering a special card to the desk of the jury, or by directly putting the answer in a computer-station.
- The questions are not listed in order of difficulty.
- All teams start at a given number of points (usually 200).
- All questions are worth 30 points at the beginning and, for each question, for each minute from the start until the correct answer is provided by some team, the score increases by 1 point. Moreover, each time an incorrect answer is given to a question by some team, the score of the question increases by 2 points.
- Each incorrect answer costs the penalty of 10 points to the team which provided it.

- When the correct answer is given, the question freezes its value and any team which gives the correct answer gets the score of the question at that moment plus a bonus depending on how many teams gave the correct answer before it.

- In the first 20 minutes the teams are asked to choose their Joker: that doubles the value of any answer given by the team, both if that is correct or incorrect.

- The team that is in the lead at the end of the race wins. The duration of the game may depend on the level of the players (usually it is 90 minutes).

The players as well as the public are informed "live" of the progress from 4 scoreboards.

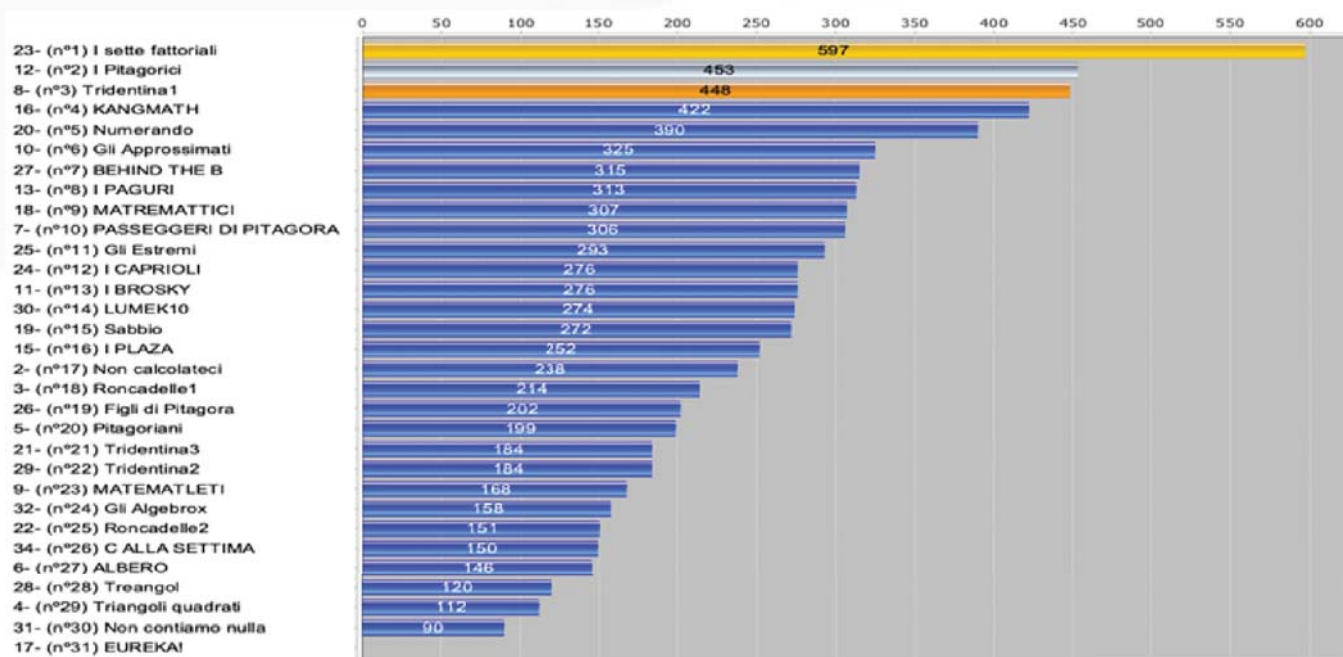
- o A first screen provides the updated ranking of the teams.

- o A second is a grid where in the rows are the teams and in the columns the outcome of the given answers: green <red> boxes indicate that the answer was correct <incorrect>; those with the joker indicate where the joker was placed.

- o A third screen shows with histograms the updated value of the questions at each moment.

- o A fourth indicates “events”. For example: “team 5 answered question 10 incorrectly – 10 points” or “team 7 answered question 11 correctly + 83 points”.

Here are samples of the first, second and third boards.



SQUADRE	1- Un segment...	2- Lasciata la c...	3- Di corsa	4- Il punteggio ...	5- L'area	6- Il più piccolo	7- Consonanti L...	8- Un problem...	9- Infinite coppie	10- Nove disch...	11- 90 x 90	12- Allegria
2- Non calcolat...	1err					2err				1err		
3- Roncadelle1	2err		2err	1err						1err		
4- Triangoli qu...	2err			1err	1err					4err		
5- Pitagoriani	1err	2err		3err			3err					
6- ALBERO	4err						2err					
7- PASSEGGE...	2err	1err										
8- Tridentina1	1err			1err							1err	
9- MATEMATL...	2err				2err		4err					
10- Gli Appros...	1err	1err					2err					
11- I BROSKY	1err			1err	1err		3err					
12- I Pitagorici	1err				1err							
13- I PAGURI	1err											
15- I PLAZA	2err											
16- KANGMATH	1err					1err	2err					
17- EUREKA!	6err			2err								
18- MATREMA...	1err			1err								
19- Sabbio	1err	2err		1err						2err		
20- Numerando	1err	1err				1err	3err					
21- Tridentina3	1err				2err	1err	2err			1err		
22- Roncadelle2	3err							3err				
23- I sette fattio...	1err			2err						1err		
24- I CAPRIOLI	1err											
25- Gli Estremi	1err			1err	3err							
26- Figli di Pita...	2err	2err					2err					
27- BEHIND T...	1err	1err	1err							1err		
28- Treangol	3err						2err					
29- Tridentina2	2err				3err		4err					
30- LUMEK10			1err									
31- Non contia...	2err	2err					2err					
32- Gli Algebrox	1err	3err	2err	1err			4err	3err				
34- C ALLA SE...	1err			2err								



QUESTO	PUNTEGGIO QUESITI		punti iniziali	punti accumulati (per risposte sbagliate)	punti accumulati (indovinata in ritardo)
	PUNTI	n° SQUADRE CHE LO HANNO INDOVINATO			
1	80	0			
2	84	1			
3	68	2			
4	66	2			
5	80	2			
6	96	1			
7	39	11			
8	41	7			
9	75	5			
10	82	0			
11	32	5			
12	70	2			
13	56	2			
14	36	12			
15	26	14			

What is the strategy to win?

I honestly don't know!

I would just say that you should always check the screens.

- A green column in the second one means that the exercise is easy, a red column that it is difficult, an "empty" column means that the exercise is difficult and that the other teams or do not dare or anyway prefer to wait;
- Each team should identify the teams that are close to it in score and monitor their moves. In the team there are 2 "special figures", the captain and the deliverer. The captain is the only one who can address the jury to ask for clarifications on the text, while the deliverer brings the special card with the answer to the jury or goes to the tablet to enter directly the answer.

Among these team competitions, there is one that is different from the others. It is the Student Cup: there are only 4 competitors per team, the competition lasts one hour, and everyone has graphing and scientific calculators. One of the goals is to prepare the student to deal with the baccalaureate written tests, where using these calculators is allowed.

The schools present the teams with t-shirts indicating the school they belong to and for the competitors wearing the school t-shirt is a real pride.

A curiosity: a few years ago, my friend Gabriela Gomez Pasquali from Paraguay came to see the Italian finals and, after seeing the team competitions, she said "They could be of great interest to companies like Team Building". There are no defined roles and only "the union and work of everyone" allows the result to be achieved.

### Watching the video may give you a better understanding.

Each competition has its own Cup which remains with the winning school for a year, until the next edition of the competition.

Can competitions be held between nations? Online competitions?

# *Kangaroo Math Summer Camps: A Global Sanctuary for Young Mathematicians*

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o z g u r e g i t i m @ g m a i l . c o m



The Kangaroo Math Summer Camps stand as premier events for young mathematicians worldwide. These camps blend rigorous academic lessons with engaging recreational activities, fostering an environment where talented students can enhance their mathematical skills while forming international friendships. Reserved for those who excel in mathematics and display a profound passion for the subject, these camps exemplify the importance of nurturing mathematical talent through competition and collaboration.

Although they are not organized in every country and not every country has the chance to participate, Kangaroo Mathematics summer camps have become an indispensable organization for participating countries.

## **Selection Process**

Participation in the Kangaroo Math Summer Camps begins with the exceptional performance in the Kangaroo Math Competition. This ensures that the selected participants represent the top echelon of young mathematicians, bringing together diverse talents and perspectives from various educational backgrounds and cultures.

## **Academic Excellence: Lessons Beyond the Classroom**

A key feature of the Kangaroo Math Summer Camps is the focus on advanced academic lessons. These lessons extend far beyond the

standard school curriculum, delving into complex topics that challenge the intellect and stimulate curiosity. Leading mathematicians and educators from prestigious universities and research institutions conduct these sessions, introducing students to advanced areas of mathematics such as number theory, abstract algebra, and combinatorics.

These lessons are designed to foster a deep understanding and appreciation for the elegance and intricacy of mathematics. Students engage in intensive problem-solving sessions that encourage them to think critically and approach problems from multiple angles. This nurturing environment promotes a growth mindset, where making mistakes is seen as an essential part of the learning process.



## **International Exchange: Building a Global Community**

A distinctive aspect of the Kangaroo Math Summer Camps is the opportunity for students to meet their peers from other countries. This international exchange fosters a global community of young mathematicians who share a common passion for mathematics, broadening their horizons and exposing them to diverse cultures and educational approaches.

Throughout the camp, students collaborate on projects and participate in team-based activities, promoting cross-cultural understanding and teamwork. They learn to appreciate different problem-solving techniques and gain insights into how mathematics is taught and perceived in various parts of the world. This interaction enhances their mathematical skills and prepares them to work in a globalized world where collaboration and communication across borders are vital.



## **Fun with Math: Games and Puzzles**

While the academic component is a significant part of the camp, equal importance is given to recreational activities that make learning enjoyable. Math games and puzzles are integral to the camp experience, offering a fun and engaging way for students to apply their mathematical knowledge. These activities range from logic puzzles and brain teasers to more structured games like mathematical chess and strategic board games.

These activities serve multiple purposes. They help reinforce concepts learned during the lessons, develop strategic thinking, and enhance problem-solving skills. Additionally, they provide a platform for students to interact in a relaxed and informal setting, strengthening the bonds of friendship and fostering a sense of community.

## **Lasting Impact: Beyond the Summer**

The impact of the Kangaroo Math Summer Camps extends far beyond the duration of the camp itself. For many students, it is a transformative experience that shapes their future academic and career paths. The skills and knowledge gained during the camp often serve as a foundation for further studies in mathematics and related fields. Moreover, the friendships and connections made during the camp can last a lifetime, creating a network of like-minded individuals who support and inspire each other.

In conclusion, the Kangaroo Math Summer Camps organized by the members of Association Kangaroo Sans Frontières are invaluable experiences that combine rigorous academic training with the joy of learning and the excitement of international exchange. They provide a unique platform for young mathematicians to explore their potential, challenge themselves, and build a global community of peers. For those fortunate enough to attend, these camps are not just a summer activity, but a stepping stone to a future filled with mathematical exploration and achievement.





## Important dates for the season 2024/2025

Kangaroo day

Thursday, March 20, 2025



### Study problems

**1.10.2024 / 17.11.2024**

Participants can study problems and group chairs can preselect problems.



### Download

#### Proposed Problems

**1.10.2024 / 19.04.2025**

Proposed problems are available for download.



### Select Problems

**23.10.2024 / 27.10.2024**

Problems preparation during Annual Meeting.



### Download Selected Problems

**30.10.2024 / 19.04.2025**

Selected problems are available for download.



### Finalize Problems

**28.10.2024 / 15.11.2024**

Problems are being finalized (Language and style improvements, corrections..)



### Download Finalized Problems

**18.11.2024 / 19.04.2025**

Final versions of problems (including latex files and all the figures) are available for download.

