SHORT CIRCUIT

Canberra Mathematical Association Inc.

VOLUME 17 NUMBER 6 JUNE 2026

NEWS AND COMMENT

Please forgive the short notice: a Questacon COP meeting is happening tomorrow, 28 May. See page 6 for details.

This initiative could be of interest to primary and secondary teachers in all sectors, but hurry.

There is also a Questacon newsletter people can subscribe to for infomation about forthcoming events and developments.

The Australian Association of Mathematics Teachers held its Annual Meeting on 25 May. In the 25-minute meeting and the very brief board meeting afterwards, various reports were accepted. CMA's Bruce Ferrington was appointed chair of AAMT's Finance and Risk Management Committee. The president is Catherine Attard. CMA president Aruna Williams attended the meeting as the CMA representative.

We await news of a new capitation arrangement with AAMT now that the professional associations, including CMA, are the only members of AAMT. (CMA members can observe from afar, but they no longer have a direct membership relation with AAMT.) We do not yet know what the cost of CMA being a member of AAMT will be.

It is believed that AAMT will soon release a document, Towards Excellence, to replace their earlier work on teacher standards. Stay tuned.

It has been noted that AAMT has accumulated 60 years worth of mathematics education resources. Some of these materials are accessible on the AAMT website but work needs to be done to curate and index the collection so that it can be made available to teachers under some arrangement. Again, we await more concrete news about this proposal.

CANBERRA MATHEMATICAL ASSOCIATION

NEWSLETTER

The CMA newsletter, Short Circuit, is distributed monthly to everyone on our mailing list, free of charge and regardless of membership status.

That you are receiving Short Circuit does not imply that you are a current CMA member but we do encourage you to join. Short Circuit welcomes all readers.

CMA MEMBERSHIP

Memberships run from 1 Jan to 31 Dec. each year. Membership forms may be downloaded from the CMA website:

http://www.canberramaths.org.au

The benefits of Membership of CMA may be found on the website.

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OUT OF FIELD INVITATION

A letter from Professor Linda Hobbs, Deakin University –

Shifting the Culture of Out-of-field Professional Education for Teachers (SCOPE-T) - National Survey

We invite you to participate in an Australian Research Council (ARC) funded study that is seeking to understand the professional education (professional development and re-specialisation opportunities) ecosystem for secondary school teachers who are teaching out-of-field (OOF), that is who are teaching subjects that don't match their qualifications.

Our study investigates the following:

* Professional education uptake
* How schools prioritise OOF teacher learning
* How policy contributes to the culture surrounding professional education for OOF teachers
* The roles of stakeholders in providing professional development
* Re-specialisation courses and the discourses around professional education

We are also interested in what attracts teachers and schools to engage with professional education designed to develop capability for teachers to be more in-field.

Our project aims to model the ecology of an education system that values diverse pathways for teachers to build capability and gain additional specialisation.

Our team consists of researchers from six universities: Deakin University, University of Tasmania, Macquarie University, Monash University, University of Queensland and University of Sunshine Coast.

Our project website will disseminate the findings of the project: https://www.scope-t.org

We are adopting a mixed-methods design for this study to understand what is currently occurring, where are the gaps and what is needed now and in the future, and who needs to be involved in shifting the culture of professional education for out-of-field teachers.

We invite you to participate in an anonymous National Survey investigating perceptions of the ecosystem of professional education for teachers teaching out-of-field. You will have the option of following up with an interview after the survey - click the link at the end of the survey.

If you wish to complete our survey, please click on this link and you will be provided with a Plain Language Statement and will be asked to consent to participating in the survey.

This is the link: National Survey

If you have any questions about the research, please use the contact details below.

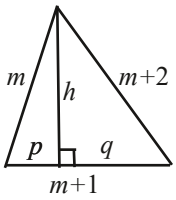
Kind regards,

Professor Linda Hobbs

Lead Investigator
For the SCOPE-T team
School of Education
Faculty of Arts and Education
Deakin University
l.hobbs@deakin.edu.au

PUZZLE

Difference



Explain why in the triangle in this diagram, m has to be greater than 1.

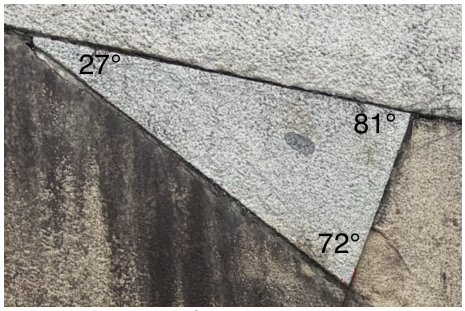
It is not hard to see that q must be greater than p, but we can also discover *how much* greater q is than p, and thus get a better lower bound for m.

The process reveals the least value of m such that m, p, q and h are all integers. Are there other values of m with this property?

PUZZLE SOLUTION FROM VOL 17 NO 5

A triangle in Japan

The three angles, measured in degrees, have two digits each. They are in the form ab, ba and cd where c has the value $a + 1$ and d has the value $b - 1$. There may be more than one such triangle. What could the angles be?



By trying out values for a and b in the equation $(10a + b) + (10b + a) + (10(a + 1) + b - 1) = 180°$, we find the additional solution 39° 93° 48°.

ON NOTATION

From Tad Kuzma

After my last article on the integer notation (Short Circuit Vol 16 No 11), I had a thought about notation in general and found some other discussion points.

Point 1: We spend many a lesson on inequalities ensuring that our students understand the symbols. For illustrations on number lines we used a small open circle to indicate a starting point and a dot (or a filled-in circle) to show inclusion. All was rosy until the notation changed. The expression $\{x: x \geq 3\}$ was easily understood to mean all the values greater than or equal to 3. Along came $x \in [3, \infty]$. Is this really any clearer? I understand it is the modern way, but did we gain any understanding from using this notation? Explain (3, 7). Is it coordinates or is it $\{x: 3 < x < 7\}$?

Point 2: As a student, I had some issues understanding 'limits' notation when investigating continuity. What does $\lim_{x \to 3+} f(x)$ mean? Does it mean x approaching 3 from the positive side or heading in the positive direction? The positive direction is numbering to the right so does it mean coming up to 3? If it means from the positive side, the numbers are positive on both sides of three. these are the confusions I first felt, and then I had students mirror them to me in my early years of teaching. I changed the language to, 'It means coming down to 3'. This worked better but I still had some difficulty with + means more and coming down means less. It all sorted out once I changed notation.

$\lim_{x \to 3+} f(x)$ became $\lim_{x \downarrow 3} f(x)$ -coming down to 3
$\lim_{x \to 3-} f(x)$ became $\lim_{x \uparrow 3} f(x)$ -coming up to 3.

I had a teacher who was doing HSC marking in NSW question the supervisors as to whether this was acceptable notation. The response was,
'It's not the accepted way. However, it would be marked correct because it's understandable'.

If it helps understanding, isn't that our educational aim?

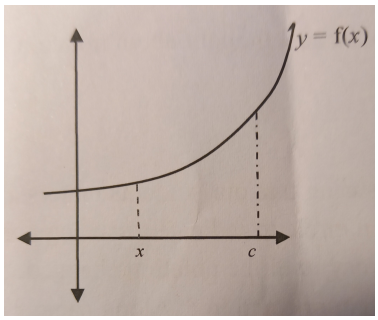
Point 3: The most common way of differentiating from first principles is $\lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$.

Why do we use h instead of δx, an increment in x? I believe that it simplifies the expression by using fewer symbols. It is a notation that helps understanding. However, by doing so we miss the connection between δx and dx in the derivative.

There is another first principles formula that interests me, $\lim_{x \to c} \frac{f(x) - f(c)}{x - c}$. It is useful when differentiating high powers of x from first principles. It uses the factorisation

$$x^n - c^n = (x - c)(x^{n-1} + x^{n-2}c + \cdots + xc^{n-2} + c^{n-1})$$

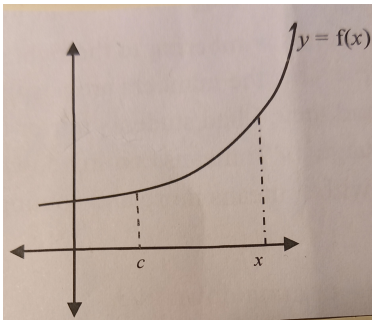
and saves you doing large algebraic expansions. The diagram drawn for this formula usually looks like this:



The first issue is that x - c and f(x) - f(c) are both negative. Do we need absolute value signs?

Secondly, as the limit has x approaching c, we end up with an answer in terms of c. We then change our answer back to powers of x as the variable can be anything.

Wouldn't it make more sense to change the diagram to:



and the limiting process to $\lim_{c \to x} \frac{f(x) - f(c)}{x - c}$. After all, x is the pronumeral we are differentiating with respect to, and c is an arbitrary point which we can move around. This little change gives an answer in terms of x. Surely that's less confusing.

... just airing some thoughts on notation. These ideas worked for my students. Hopefully, this will start some conversations.

Let's make it easier for students to understand our subject by adopting user friendly notation.

STEM

Dear CMA team,
My name is Flora, and I wanted to let you that the **Get into STEM They did what?** Student video competition is back for another year.

We're calling on students from across Australia to help uncover inspiring stories of everyday Australians making a difference in STEM. We're shining a spotlight on voices and experiences that are under-represented in the usual narratives of STEM success.

Students from Foundation to Year 10 are invited to create a short video (up to 3 minutes) showcasing the STEM achievements of an unsung Australian STEM star.

Classroom-ready resources are available, alongside materials to support students to participate independently. No fancy equipment needed, just creativity, curiosity and a great story.

Let's celebrate Australia's STEM community and inspire students to imagine their own STEM futures.

- Free to enter for students enrolled in Australian schools
- Win prizes up to $300
- Entries close 16 October 2026

Information, entry requirements and classroom resources are available at:
https://www.getintostem.edu.au/students/they-did-what-competition/

Get into STEM provides a suite of free resources created for students, educators and families to encourage inclusive STEM engagement in under-represented communities. As part of the Department of Industry, Science and Resources' Pathway to Diversity in STEM Review, Get into STEM has now expanded its remit to include lower primary school and to support diverse communities under-represented in STEM.

We are pleased to announce the launch of the Get into STEM LinkedIn page and invite you to follow us for updates.

Flora Smith (she/her)
Education Services Australia Ltd, 03 9657 9772 | flora.smith@esa.edu.au | www.esa.edu.au

AI SYSTEMS FOR EDUCATION

Teacher magazine of 5 May contains an article by Andreas Schleicher, Director for Education and Skills at the OECD, on uses and abuses of AI in education: 'Designing safe AI systems for education'.

The territory is changing, and the insights contained in the Teacher article provide a starting points for an understanding of what might evolve through the new technology.

Schleicher outlines some likely benefits of AI tools but says, '... here's the catch: Learning does not happen when the machine does the thinking for you'.

Links in the Teacher article lead to OECD material, including to the series 'OECD Digital Education Outlook' for the years 2021, 2023, 2026.

Click this link to access the 2026 edition. Its introduction follows:

> Generative AI (GenAI) is reshaping the educational landscape, beyond teaching and learning. Unlike earlier waves of education technology, much of GenAI is freely accessible and largely used beyond institutional control due to its intuitiveness and versatility. The OECD Digital Education Outlook 2026 analyses emerging research that suggests GenAI can support learning when guided by clear teaching principles. However, if designed or used without pedagogical guidance, outsourcing tasks to GenAI simply enhances performance with no real learning gains. The Outlook highlights the benefits of GenAI as a tutor, partner and assistant, and synthesises experts' evidence and insights on the design criteria that make it work for education.

VOICE PROTECTION

A Flinders University PhD student, Paige Abblitt, is seeking participants in a project to create a professional development initiative to do with teachers and their vocal organs.

A Participant Information Sheet and Consent Form can be accessed by clicking this link.

Contact Paige.Abblitt@flinders.edu.au for more information.

THE 2026 CMA COMMITTEE

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Theresa Shellshear is CMA's COACTEA representative.
Bruce Ferrington is CMA's AAMT representative.
Short Circuit is edited by Paul Turner.

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ABOUT THE CMA

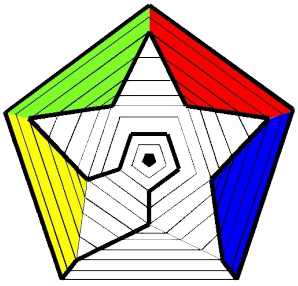
The Canberra Mathematical Association (Inc.) is the representative body of professional educators of mathematics in Canberra, Australia.
It was established by, among others, the late Professor Bernhard Neumann in 1963.
It continues to run - as it began - purely on a volunteer basis.
Its aims include:

- the promotion of mathematical education to government through lobbying,
- the development, application and dissemination of mathematical knowledge within Canberra through in-service opportunities, and
- facilitating effective cooperation and collaboration between mathematics teachers and their colleagues in Canberra.

Short Circuit is the newsletter of the Canberra Mathematical Association Inc.
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http://www.canberramaths.org.au/

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The vertices of a dodecahedron belong to a Hamilton circuit.



NMSS 2027

The National Mathematics Summer School for 2027 will take place from 10 to 23 January. The school is set to run as usual at the Australian National University, with all students and staff in residence on campus.

Comprehensive information about the Summer School is available on the NMSS website: https://nmss.edu.au/.

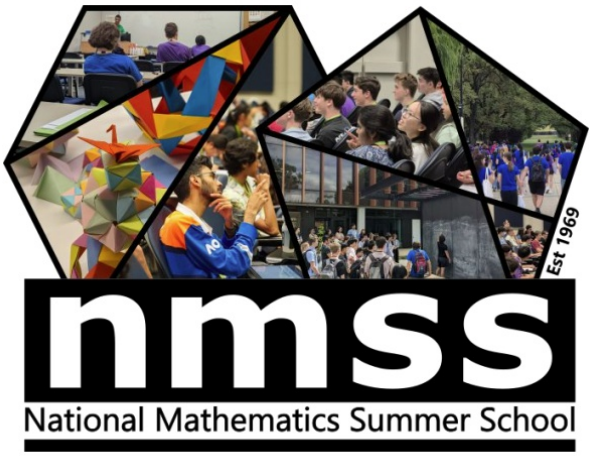
Eligible students will have completed year 11 and expect to study for their year 12 in 2027.

Applications have now opened through a centralised, online application form, administered through the NMSS website. This link connects directly to the application form.

The application deadline has been set to Friday 28 August. Students are required to list the email address of their nominating teacher, and the submission of their form will trigger an email request for the teacher to complete an online nomination form within three business days.

The numbers of students selected for the Summer School from each state and territory are in proportion to the population size. Generally, two places are allocated for ACT students.

After the applications are received by the NMSS, a subcommittee of the CMA recommends which ACT students should be offered a place, based on their demonstrated aptitude and achievement in mathematics.



RECONCILLIATION READING

The newsletter of 15 May from Reconcilliation Australia has a section of recommended reading. The list can be accessed by clicking this link.

Every year workplaces, schools, early learning services, community groups, reconciliation groups, and people right across the country host a range of activities and events during National Reconciliation Week (NRW).

The dates for NRW are the same each year: 27 May to 3 June.

QUESTACON COP

Questacon's STEM Educator Community of Practice Term 2 will be hosted by Emma Harris (STEM specialist teacher) at St Francis of Assisi Primary School, Calwell, on **28 May 2026** (4–6pm).

You are invited to attend this free, in-person professional learning session. Places are limited. You are receiving this invitation as a valued Canberra educator.

What's on offer

By registering, you'll gain access to a collaborative and practical professional learning experience, including:

• Opportunities to network with Canberra educators and local STEM industry experts
• Practical, classroom-ready, hands-on activities
• Free STEM planning resources to take back to your classroom
• Exclusive access to Q.Ed Community, Questacon's online community of practice platform. A STEM hub for state-based communities led by teachers and supported by Questacon, with in-person and virtual meet-ups, a Teams channel for connection, professional learning resources, and grab-and-go STEM activities to support your classroom practice.

What you need to do

Register your attendance by scanning the QR code below, or via this registration link.

Stay up to date with Questacon news and events by subscribing to our Educator Newsletter.