SHORT CIRCUIT

Canberra Mathematical Association Inc.

VOLUME 17 NUMBER 3 MARCH 2026

NEWS AND COMMENT

The Canberra Mathematical Association annual conference for 2026 is only weeks away. See the flyer on page 4.

Arrangements are in place although with a **change of venue**. It turns out that ADFA is no longer available. Instead the venue is the UNSW Canberra City Campus, Constitution Avenue - the old Reid CIT.

Registration is now open.

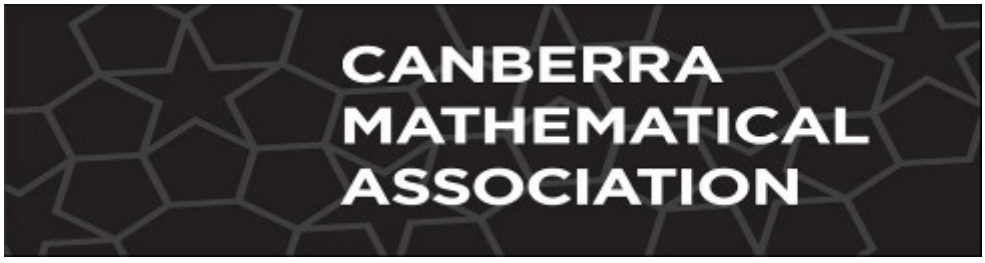
On occasion, this publication has said some unkind things about Artificial Intelligence, concerning its mathematical aptitudes. Now, we have been contacted by a researcher at Western Sydney University who wishes to explore the perceptions of teachers about its usefulness in engaging students.

If you can spare 15-20 minutes to complete a survey on this, your contribution would be gratefully received.

Click on this link to get the details and start the survey.

On page 7, you will find details of a professional development opportunity arising from our connection with the Aboriginal and Torres Strait Islander Mathematics Alliance (ATSIMA). The event is a collaboration between ATSIMA, Melba Copland Secondary School, and CMA. It is designed to be of interest to both primary and secondary teachers.

The number of attendees has been capped at 32. So, act quickly to register if you wish to attend. The date for the event is Monday, 20th April.



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.

Inside:

PERSISTENCE AND ACADEMIC RESILIENCE – HOW LEARNING HAPPENS

This article is by Martin Westwell, Chief Executive of the South Australian Department for Education. It comes from Teacher, 17 February, 2026. (ACER)

For many years we have often talked about persistence and resilience as if they are personal qualities students either have or do not have. We encourage children to 'keep going' and to 'bounce back', sometimes with the quiet implication that effort is a matter of character. Recent research provides a nuance to this understanding which is more useful for teachers and more hopeful for students.

A major systematic review published at the end of last year (Sparks et al, 2025) synthesised findings from 74 studies on persistence and academic resilience across K–12 education. Its conclusion is clear: persistence and resilience are not fixed personality traits. Rather, they are part of the learning process – shaped by task design, classroom conditions, and how teachers respond when students struggle.

From the studies reviewed, a shared definition of persistence is proposed*: sustained effort toward completing a goal-directed task despite difficulty*. Importantly, persistence only exists when there is a clear task, genuine challenge, sustained effort and eventual completion.

This matters, because it shifts the focus away from student willpower and onto learning design. If tasks are too easy and students stay in the familiar and routine, then there is nothing to persist through. If tasks are overwhelming or poorly designed, persistence collapses into avoidance. Productive persistence emerges when challenge is deliberate and support is well timed.

This definition aligns closely with findings from cognitive science. Learning – especially early reading, mathematics, and complex problem-solving – is effortful before it becomes fluent. Along the way, students must work through a lack of certainty, slow progress, and repeated errors long enough for understanding and automaticity to develop.

When students disengage early, instruction cannot do its work, no matter how well it is executed. Persistence is what keeps learners in the cognitive task long enough for learning to take hold.

So, when students struggle, is something going wrong, or is something important happening? Research on productive struggle helps explain why grapple in learning is not only normal but can be necessary. Students who are required to think hard, make mistakes, and work through uncertainty tend to develop deeper understanding and longer-lasting learning than those who experience only smooth success.

As Professor Dylan Wiliam reminds us, 'doing things in unfamiliar ways leads to learning that is deeper, better connected to existing learning and therefore remembered for longer' (South Australian Department for Education, n.d.).

To support this process, evidence-informed instructional approaches such as productive failure, erroneous examples, and affect-aware feedback are useful. Affect-aware feedback responds not just to a student's performance, but to how they are feeling in the moment, adjusting feedback to reduce frustration, counter boredom, and sustain productive engagement.

These approaches do not remove difficulty; they contain it. Students experience challenge within structures that prevent collapse, allowing effort to be sustained rather than abandoned.

If persistence operates during difficulty, academic resilience operates after it. The systematic review defines resilience as: *the process of adapting and re-engaging following setbacks, stress, or failure in order to achieve learning success over time*.

This distinction is important, because learning is

rarely linear. Students who learn well are not those who never struggle, but those who recover productively when they do. A student may persist for a while, fail, and disengage permanently: persistence without resilience. Another may falter, adjust, and return: resilience at work.

There is a clear message from the research cited in the review – students are more likely to recover from errors when mistakes are treated as information rather than judgement, and when teachers respond calmly and strategically rather than urgently. Over time, these experiences shape students' expectations about learning itself: that the grapple is temporary, manageable, and worth working through.

One of the most powerful findings in the review is that persistence and resilience are context-dependent. They are shaped by how safe, structured, and supportive students perceive their learning environment to be.

Of course, it is the student's perception of the environment, not anyone else's. Students are more likely to sustain effort and recover from setbacks when tasks are challenging but achievable, expectations are clear, feedback focuses on strategies rather than speed or ability, and teachers respond to struggle without signalling alarm.

This helps explain why persistence is a good predictor of achievement. It can be less about students' intrinsic motivation and more about whether learning environments are designed for students to remain cognitively engaged when learning becomes demanding.

The implication for teaching is simple but profound. We cannot improve learning outcomes without designing for persistence and resilience. Persistence is built through tasks that require sustained effort. Resilience is built through how teachers respond to error and setback. Both can be shaped to improve students' outcomes.

Getting the level of difficulty right depends less on formulas and more on teachers' professional judgement, developed through collegial conversations that help fine tune tasks and the learning experience of each child.

As educator Dan Meyer expressed it, there is a risk that without designing for persistence and resilience, we might find ourselves 'paving a smooth, straight path from [challenge to solution] and congratulating our students for how well they can step over the small cracks in the way.'

When classrooms are designed to support students through the right level of difficulty rather than to find ways around it, learning becomes deeper, more durable, and more equitable.

References

Meyer, D. (2010, March). *Math class needs a makeover* [Video]. TED Conferences. https://www.ted.com/talks/dan_meyer_math_class_needs_a_makeover

South Australian Department for Education. (n.d.). *Dylan Wiliam in SA*. AC Leaders Resource.

Sparks, J. R., Lehman, B., Gladstone, J. R., Zhang, S., Schroeder, N. L., & Israel, M. (2025). Measuring persistence and academic resilience of K−12 students: systematic review and operational definitions. *Frontiers in Education*, *10*. https://doi.org/10.3389/feduc.2025.1673500

CONFERENCE 2026

Canberra Mathematical Association

2026 Mathematics Conference

Mathematics: Are You Game?

Saturday 28 March 9am-5pm

New Venue!

UNSW Canberra City Campus

Constitution Ave (old Reid CIT)

Keynote Speakers

Kristen Tripet (UC)

James Russo (Monash)

Six sessions of talks/workshops for all levels

Great prizes Trade stalls

All food + President's drinks

Registration: $100 CMA member

$50 concession $150 non-member

Pre-service students free

Details and registration at *canberramaths.org.au*

For invoices, email Jane.Crawford@covenant.act.edu.au

Contact: *pdmcintyre@icloud.com*

Registration now open

NEWSLETTER OF THE BUSINESS NAME INC

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Weston ACT 2611
Australia

E-mail: canberramaths@gmail.com

We're on the Web!
http://www.canberramaths.org.au/

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.

THE 2026 CMA COMMITTEE

President	Aruna Williams	Erindale College
Vice President(s)	Bruce Ferrington,	Radford College
	Peter McIntyre	University of NSW Canberra
Secretary	Valerie Barker	
Treasurer	Jane Crawford	Covenant Christian School
Membership Sec.	Paul Turner	
Councillors	Theresa Shellshear	Australian Catholic University
	Heather Wardrop	
	Andrew Wardrop	
	Yuka Saponaro	Melba Copland Secondary School
	Bernadette Matthew	Mother Teresa School
	Linda Goth	
	Katrina Simms	

Theresa Shellshear is CMA's COACTEA representative.

Bruce Ferrington is CMA's AAMT representative.

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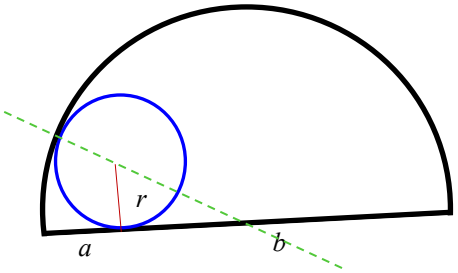
Find us on Facebook

http://www.facebook.com/pages/Canberra-Mathematical-Association/110629419011275

PUZZLE SOLUTION from Vol 17 No 2



Find an equation relating the radius r of the small circle and the segments a and b of the diameter of the semicircle.

If it should happen that $r = 1$ and $b = a^2$, what special number would become the value of a?

A line constructed between the meeting point of the two circumferences and the centre of the semicircle contains both a diameter of the small circle and a radius of the semicircle. Calculations of the distance between the centres of the circles along this line should lead to the required equation.

If the radius of the semicircle is R, the distance between centres is $R - r$. Then, by Pythagoras, we have $(R - r)^2 = (R - a)^2 + r^2$.

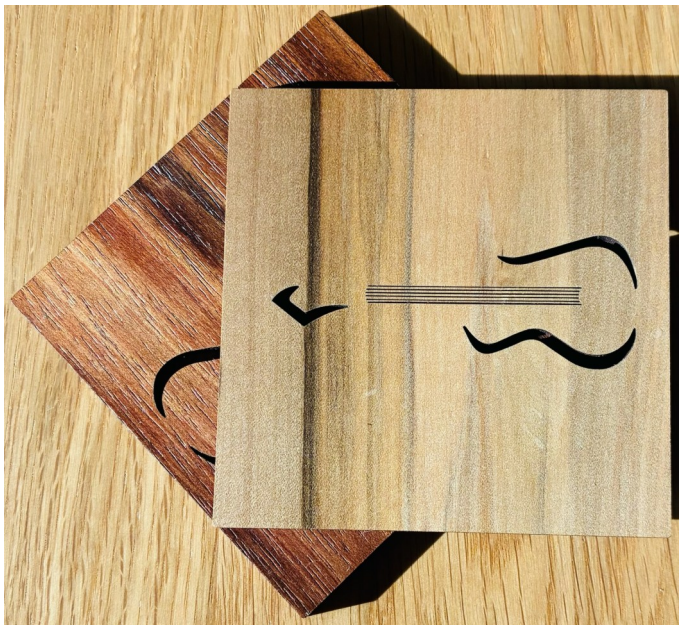
Equivalently, $2R(a - r) = a^2$. But $R = (a + b)/2$. So, $(a + b)(a - r) = a^2$.

After simplification and rearrangement, this is

$$1/r = 1/a + 1/b.$$

In the special case $r = 1$ and $b = a^2$, the equation becomes a quadratic in a with the positive solution $a = (1+\sqrt{5})/2$. This number is usually given the symbol φ and is known as the *golden ratio*.

PUZZLES



1. Coasters

From Ed Staples

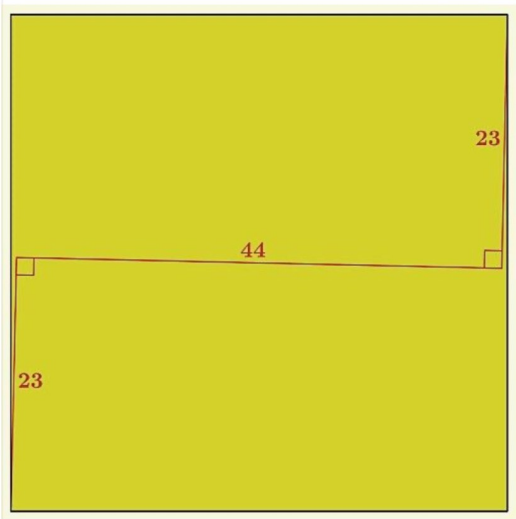
Pictured above are two Tasmanian Wood coasters (with optional guitar engravings). The coasters are square. The upper, Sassafras, coaster has been placed over the lower, Blackwood, coaster so that two corners of the upper coaster just touch two sides of the lower coaster and the three visible triangles are isosceles.

In this arrangement, part of the surface of the Blackwood coaster is visible and part invisible. What is the proportion of visible to invisible surface?

2. Year of the yellow square

From Adrián Fuentes de la Peña

Calculate the area of the yellow square.



CMA MATHS WORKSHOP

Canberra Mathematical Association
Proudly sponsored by Melba Copland Secondary School

MON, 20 APRIL 2026
TERM 2, PUPIL-FREE DAY

08:30 - 14:30

MELBA COPLAND SECONDARY SCHOOL (HIGH SCHOOL)
15 Conley Dr, Melba

RE-ENGAGING STUDENTS THROUGH MATHS AS STORYTELLING (GOOMPI MODEL)

Do you have disengaged students who have strengths in sports or hands-on activities? Are you interested in using narrative to teach abstract mathematical concepts?

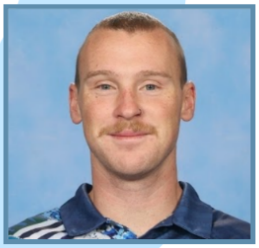
Join Prof Chris Matthews (Aboriginal and Torres Strait Islander Mathematics Alliance) and 2 ACT teachers in this interactive workshop to learn how.

Keynote Speaker

Professor Chris Matthews

Creator of Maths as Storytelling (Goompi Model)
ATSIMA CEO, Mathematician

Presenter
Yuka Saponaro
CMA Councillor
MCSS Mathematics Education Facilitator
(Indigenous & Maths Anxiety Perspectives)



Presenter
Dylan Hatton
MCSS Maths & HPE Teacher
Body-Mind-Spirit (BMS) Maths Program Teacher

REGISTRATION FEE $100 PER PERSON VIA LINK - CLOSES 13/4 (32 SPOTS ONLY)

Trybooking Goompi Model
For tax invoices, please email: canberramaths@gmail.com

BYOD Please bring your *own* device to co-create Maths as Storytelling resources.

08:30 - 09:10

08:30 - 09:00: Registration
09:00 - 09:10: Acknowledgement of Country

09:10 - 10:00

Presenters: Yuka Saponaro & Dylan Hatton
Outdoor Maths - Goompi Model using sports culture and sports language
(BMS Maths Program - 3rd year at MCSS)

10:00 - 11:00

Keynote Speaker: Prof Chris Matthews
Exploring Maths as Storytelling (Goompi Model) with practical examples
National Indigenous Commitment Statement

11:00 - 12:30

11:00 - 11:30: **Morning Tea (provided)**
11:30 - 12:30: Small Group Activity - Unpacking the Goompi Model and co-creating resources guided by Chris (Yuka & Dylan to assist)

12:30 - 14:00

12:30 - 13:00: **Lunch (provided)**
13:00 - 14:00: Finish resources, share with other groups (or present them)

14:00 - 14:30

Maths as Storytelling (Goompi) Reflection
T2, Week 3 Check-in
ATSIMA & CMA Memberships
Closing Speech

Key: Blue = Hyperlink