SHORT CIRCUIT

Canberra Mathematical Association Inc.

VOLUME 16 NUMBER 2 FEBRUARY 2025

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.

NEWS AND COMMENT

On page two of this edition there is mentioned a book by and an interview with Dean Ashenden, a well-known journalist and commentator on education and other matters.

As a serendipitous testament to Mr Ashenden's industry as a writer, we note an article by him published by Inside Story just yesterday.

The article encourages the premier of South Australia, Peter Malinauskas, in his educational vision that tackles the centralised national control apparatus and challenges certain beliefs about the nature and purpose of education.

Ashenden's article, 'Courage, minister!' is provocative. It concludes with a whimsical speech he has written for a future SA premier, to be delivered in the year 2030. Here is one of many quotable paragraphs from the speech:

> We emphasise that schools do not exist to provide teaching — or to distribute knowledge. They are places in which young people and adults come together as joint producers of learning and growth.

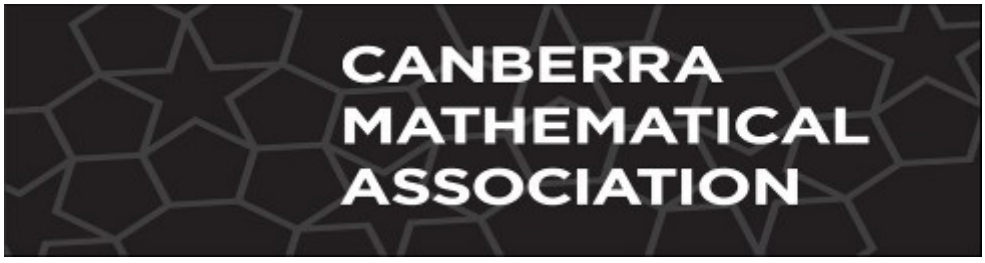
The 2025 CMA Conference will be held on Saturday 15 March. Save the date.

A welcome event for 2025 is proposed for Friday 21 February at ACU. Confirmation and details to follow.

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:

Puzzles—p.2
CMA council 2025—p.3
Tip—p.4

ATSIMA CONFERENCE

Save the date:

ATSIMA's biennial conference will be held 1–3 October 2025 on Bruny Island, Tasmania.

The Aboriginal & Torres Strait Islander Mathematics Alliance (ATSIMA) is currently working in collaboration with the local Aboriginal Community. More information is coming soon.

For further enquiries contact enquiries@atsima.org.

RESOLVE

In 2024, the Australian Academy of Science Education team launched their reimagined Primary Connections science and reSolve mathematics offerings.

Click the links to see what is on offer, and for a short video of the launch.

THE GREAT AUSTRALIAN SILENCE

The book *Telling Tennant's story: The Strange Career of the Great Australian Silence,* by Dean Ashenden, was published by Black Inc in 2022.

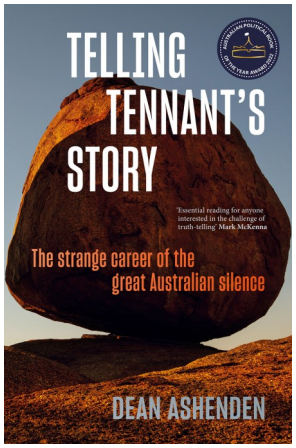
It is relevant now in 2025 in relation to the commitment statement made by CMA and the other state associations following the ATSIMA/AAMT summit last year. (The Commitment Statement is reprinted below.)

The author Dean Ashenden grew up in Tennant Creek but remained only peripherally aware of the social realities of the place until much later. As he explained in a Late-Night-Live interview with Phillip Adams on ABC radio in 2022, there has been a reticence across the country about telling the truth about the treatment of the aboriginal inhabitants by the British settlers.

Anthropology, until the work of W.E.H. Stanner, had been about the pre-colonial era, and when Ashenden was a university student in the 60s, the history of black-white interactions was absent from the history curriculum.

The idea of the Great Australian Silence was proposed by Stanner in his 1968 Boyer Lecture. Ashenden seeks to explain its origins and its persistence in Australian institutions.

The 20-minute Late-Night-Live interview is informative. It can be accessed by clicking on the link. Better still: read the book!



See also Ashenden's Inside Story article from October 2024.

COMMITMENT STATEMENT

Aboriginal and Torres Strait Islander Mathematics Alliance

ATSIMA

Transforming Maths Education

aamt

Our responsibility is to drive a cultural shift to make a systemic difference in mathematics education for Aboriginal and Torres Strait Islander learners.

We commit to:

- truth-telling which recognises the past and builds capacity for the future
- building relationships by listening to and learning from and with Aboriginal and Torres Strait Islander Communities
- creating sustainable partnerships based on trust and respect
- leading and supporting culturally responsive practices and
- advocating for a shared understanding of success.

In doing so, we agree to be unwavering and accountable in actioning this commitment to achieve positive outcomes for Aboriginal and Torres Strait Islander learners.

FREE ONLINE CONFERENCE

On at the moment is The 4th Annual, 2025 Australian Maths Teachers Online Conference (AMTOC), presented by Dr Ange Rogers. The event began on 20th January and recordings of the sessions can be accessed at no cost until 17th February.

There are presentations from 22 Australian Maths Educators on the theme "The best piece of advice I can share about teaching maths in 2025...".

NMSS

The National Mathematics Summer School 2025 took place over the two weeks from 5 to 18 January at the ANU.

The director of the school, Associate Professor Norm Do, reports that the school ran smoothly. He believes that all students and staff gained a great deal from the experience.

Professor Do thanked those who helped by promoting the summer school and in student selection. The student cohort that is assembled plays a large part in dictating the culture of the school, he said.

Planning is under way for the 2026 summer school and applications will open in April or May. There will be a central online application form.

Teachers are encouraged to promote NMSS 2026 to their students. The dates for the school are 4 to 17 January, 2026.

STUDENT TEACHER EXPERIENCES

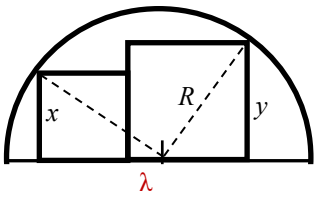
Researchers Tracey Muir, Julia Hill and Sharyn Livy surveyed 300 students who were studying to be primary teachers. All were enrolled in their first maths education unit. In an article published in The Conversation, they speak of 'bad maths experiences at school' and their consequences.

The full article contains much good advice, emphasising the role of the teacher in the maths learning process. It can be accessed by clicking on the link. Here are some excerpts:

> We frequently see students enter our university courses lacking confidence in their maths knowledge and their ability to teach the subject. Some students describe it as maths trauma.
>
> We asked them to recount a negative and positive experience with maths at school. Many described feelings of shame and hopelessness. These feelings were often attributed to unsupportive teachers and teaching practices when learning maths at school.

PUZZLE SOLUTIONS from Vol 16 No 1

1. Surprising squares



In terms of the radius R and the sides of the two squares x and y, find an expression for the combined areas of the squares.

The label λ applies to the small segment between the centre of the circle and the common point of the squares where the corners meet.

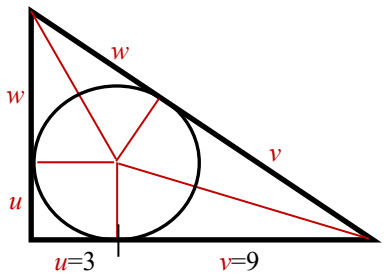
We have by Pythagoras

1. $R^2 = x^2 + (x - \lambda)^2$ and
2. $R^2 = y^2 + (y + \lambda)^2$

Subtracting the second equation from the first, gives $x^2 - y^2 - \lambda(x + y) = 0$. So, $\lambda = x - y$.

When this value for λ is substituted into either equation, we find $R^2 = x^2 + y^2$, which is the combined area of the squares.

2. Incircle



(i) What is the area of the triangle? (ii) What geometrical facts were needed to solve this problem? (iii) If instead of lengths 3 and 9 we had lengths u and v, is there a general expression for the area of the triangle?

The area is $A=(u+v)(u+w)/2$. Also, $(u+v)^2 + (u+w)^2 = (v+w)^2$. From the second of these equations, $w = u(v + u)/(v - u)$. After substitution and simplification, we have

$A = uv(u + v)/(v - u)$.

In the numerical case given, we have $w = 6$, and $A = 54$. The solution called on the fact that tangents from a point to a circle have equal length and we needed Pythagoras' theorem.

3. Alphameric

H A L F
F I F T H
T E N T H
T E N T H
T E N T H
W H O L E

This sum is correct semantically and needs to be correct arithmetically when each letter is replaced by a different particular digit from 0 to 9.

There are ten letters to be mapped to 10 digits. There must be 10! = 3628800 ways in which this can happen, so a solution will be hard to find by random trials.

Attempts to find a solution under the assumption that leading zeros were not permitted always led to contradictions. However, this mapping works:

0 ↔ T
1 ↔ H
2 ↔ N
3 ↔ F
4 ↔ O
5 ↔ A
6 ↔ W
7 ↔ E
8 ↔ I
9 ↔ L

NEWSLETTER OF THE CANBERRA MATHEMATICAL ASSOCIATION INC. INC

PO Box 3572
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 2025 CMA COMMITTEE

President	Bruce Ferrington	Radford College
Vice President	Aruna Williams	Erindale College
Secretary	Valerie Barker	
Treasurer	Jane Crawford	Brindabella Christian College
Membership Sec.	Paul Turner	
Councillors	Peter McIntyre	University of NSW Canberra
	Theresa Shellshear	Australian Catholic University
	Heather Wardrop	
	Andrew Wardrop	
	Yuka Saponaro	Melba Copland Secondary School
	Jo McKenzie	ACT Education Directorate
	Bernadette Matthew	Mother Teresa School

Theresa Shellshear is CMA's COACTEA representative.

Bruce Ferrington is CMA's AAMT representative.

Short Circuit is edited by Paul Turner. **ISSN 2207-5755**

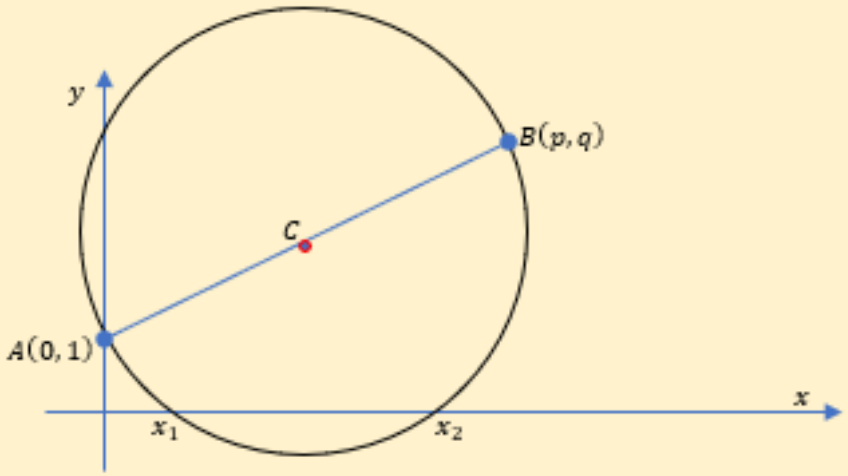
Find us on Facebook

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

Carlyle and the Quadratic

Thomas Carlyle (1795-1881), the British historian and mathematician, devised an ingenious geometric method for locating the roots of the quadratic equation $x^2 - px + q = 0$ involving a ruler, a compass and a sharp pencil. The method is described as follows.

Plot the points $A(0,1)$, $B(p,q)$ and their midpoint $C\left(\frac{p}{2},\frac{1+q}{2}\right)$ on the cartesian plane. Draw in the circle, centre C radius CA and read off the x intercepts x_1 and x_2 as the roots of the quadratic equation.



As an example, for $x^2 - 5x + 4 = 0$, the coordinates of the diameter's endpoints are $A(0,1)$, and $B(5,4)$. Using a compass, with centre $C(2.5, 2.5)$ and radius CA, draw in the circle, and read off the roots (at the x intercepts) as $x_1 = 1$ and $x_2 = 4$.

Why it works

For the given points $A(0,1)$ and $B(p,q)$ we determine $C\left(\frac{p}{2},\frac{1+q}{2}\right)$ with radius AC given by the equation $r = \frac{1}{2}\sqrt{p^2 + (q-1)^2}$. The circle's equation is then $\left(x - \frac{p}{2}\right)^2 + \left(y - \frac{1+q}{2}\right)^2 = \frac{r^2+(q-1)^2}{4}$. Setting $y = 0$ and simplifying reveals that the circle intersects the x axis at $x = \frac{p \pm \sqrt{p^2-4q}}{2}$. These are the roots of the quadratic equation.

If $p = q + 1$ then $x_1 = 1$ and the circle has centre $C\left(\frac{p}{2},\frac{p}{2}\right)$.

If $p^2 = 4q$ the circle has centre $C\left(\frac{p}{2},\frac{p^2+4}{8}\right)$ and is tangent to the x axis at $x_1 = \frac{p}{2}$.

Challenge 2: The general circle intersects the y axis in at most two places. One of them is $A(0,1)$. Find the other.