

SHORT CIRCUIT

Canberra Mathematical Association Inc.

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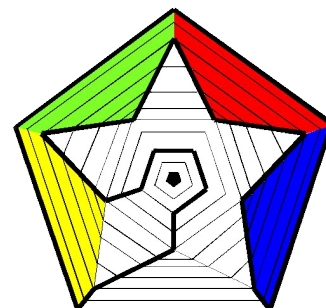
NEWS AND COMMENT

Winter is coming but there is still no ice on the bird baths. Could there be a maths lesson in that observation?

In this edition Andy Wardrop provides information about the Canberra Mathematics Talent Quest (on page 2). Some ACT schools have engaged enthusiastically with this activity over the past few years. We encourage others to consider it as part of their mathematics program.

Applications for the 2026 National Mathematics Summer School for promising year 11 students who are about to go into year 12 will open soon. Details will be distributed shortly.

There is room in Short Circuit for your observations, articles, ideas, news items, concerns, opinions and topic suggestions. Your communications are always welcome.



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): <http://www.canberramaths.org.au>

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

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**CANBERRA
MATHEMATICAL
ASSOCIATION**

CANBERRA MATHEMATICS TALENT QUEST 2025

The National Mathematics Talent Quest has provided a venue to showcase the creative thinking skills of students in Australia for many years.

To be eligible to enter the national quest a project has to be successful in a similar quest at the state level. Hence, we are running the Canberra Mathematics Talent Quest 2025.

Students throughout the ACT put considerable time and effort into mathematics assignments and projects and they now have a means to get local or even national recognition and encouragement for their work.

Students may participate in the quest in one of three categories:

Submit an **individual** entry

Be part of a **small group** (up to 5 students)

Be part of a **whole class** entry (6 or more students)

Entry is free.

All students from Kindergarten to Year 12 in the ACT can submit an entry. Schools can submit up to two entries per category (individual, group or class) per year group to be assessed by an ACT judging panel.

The project or assignment can be the student's own idea or a teacher's set task with an outstanding student response.

The projects or assignments may be presented in any format, including:

Essays, scripts, stories, poems, diaries, illustrated texts, newspaper format or any other form of writing

Posters

Videos

Models – static or working

Computer based (coding)

PowerPoint presentation

Spreadsheet or database.

Entries in most of the states have moved to digital submissions, usually using PowerPoint.

Entries that win in their category can proceed to the national competition, but note that entries in the National Mathematics Talent Quest must be submitted electronically. This is due to the way the entries are evaluated by judges in the states and territories.

You can start anytime but the entry date is Friday 1st August 2025. We will distribute instructions about how to submit entries in July.

Look for updates in *Short Circuit* and on the CMA [webpage](#):

<http://www.canberramaths.org.au/>

SINGAPORE STUDY TOUR

AAMT is organising a study tour to Singapore in July 2026. The tour is scheduled for the week commencing 6 July.

It is expected to be a professional learning experience for both primary and secondary teachers who want to reflect on their own practice. Participants will learn from one of the world's consistently high-performing systems, with a community of educators from across Australia.

Email AAMT at office@aamt.edu.au, for the itinerary and to register your interest.

MATHEMATICS AS STORY TELLING

The [website](#) of the Queensland Curriculum and Assessment Authority has a page explaining the concept Mathematics as Story Telling (MAST) that has been developed by Dr Chris Matthews.

Dr Matthews argues that most students (Indigenous and non-Indigenous) only experience mathematics in its abstract form, and do not experience and appreciate the cycle of abstraction and critical reflection.

The idea of the MAST approach is to begin with a story within the experienced reality of the students and only then to proceed towards abstraction and generalisation and the use of symbols.

Details of the approach as developed by Dr Matthews are expanded in the website.

AUSTRALIAN ACADEMY OF SCIENCE

From the Australian Academy of Science:

In April, the Australian Academy of Science released brand new [reSolve](#) mathematics resources and upgraded existing teaching sequences and professional learning based on the [reSolve Approach](#).

Our new digital teaching sequences are designed from the ground up to be easily adapted for your students. You can use the step-by-step outlines as-is or adapt them using the built-in design advice, with confidence that your teaching is grounded in the latest research and fully aligned to the Australian Curriculum Version 9.

PUZZLES

1. Fixed point

Three numbers a , b and c are in arithmetic progression. The linear relation $ax + by + c = 0$ has a straight-line graph. It is claimed that the line always passes through a certain fixed point.

Identify the fixed point and explain why it exists.

2. Age difference

A book by Isaac Greenwood, published in 1729 in Boston, is thought to be the first textbook on arithmetic written in English by a native American.

Greenwood's book, titled 'Arithmetik Vulgar and Decimal: with the Application Thereof, to a Variety of Cases, in Trade and Commerce' contains the following problem about a husband and wife.

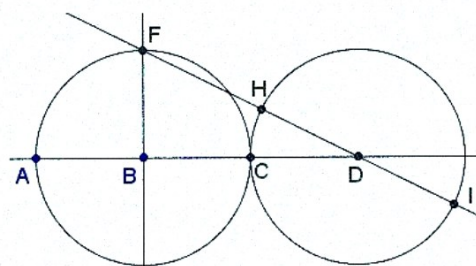
'... [suppose] *One* is *Three* times as old as the *Other*, and after *Fifteen* years, that the *One* would be again just [three times] as old as the *Other*. How old was each of Them when they married?'

The book gives, without explanation, an arithmetical procedure for finding the solution. How would you do it?

3. Unlikely meeting

Two friends set up an appointment time between 1 p.m. and 2 p.m. They each decided to wait for the other no longer than 10 minutes on arriving sometime within the hour. How likely are they to meet?

4. Circles and a ratio



Two equal circles are centred at B and D and the radius $BC = CD$. Point F is at the top of (B) and the line FD crosses (D) at H and I.

What can be said about the ratio HI/FH ?

PUZZLE SOLUTIONS from [Vol 16 No 5](#)

1. Numbers and matrices

Are there any numbers a and b such that $(a + b)^2 = a^2 + b^2$?

We might note that $(a + b)^2$ seems to be greater than $a^2 + b^2$ whatever numbers are tried, with the difference between the expressions being smaller when a or b are small.

To be certain, expand $(a + b)^2$ to $a^2 + 2ab + b^2$. Clearly, the expressions can only be equal when a or b or both are zero.

Are there any 2×2 matrices A and B such that

$$(A + B)^2 = A^2 + B^2?$$

2×2 matrices are multiplied according to the rule:

$$\begin{bmatrix} a_1 & a_2 \\ a_3 & a_4 \end{bmatrix} \cdot \begin{bmatrix} b_1 & b_2 \\ b_3 & b_4 \end{bmatrix} = \begin{bmatrix} a_1b_1 + a_2b_3 & a_1b_2 + a_2b_4 \\ a_3b_1 + a_4b_3 & a_3b_2 + a_4b_4 \end{bmatrix}$$

As in the 'number' case, we would require $AB = 0$, and each of the matrix entries on the right would need to be zero. The zero matrix works for A and B , but consider the possibility that A and B are both non-zero.

Then neither A nor B can be invertible matrices. (Otherwise, $A^{-1}AB = A^{-1}0$ so that $IB = 0$, where I is the identity matrix. Thus, $IB = B = 0$, which is false by assumption.)

Then, the rows of A and B are not independent, which means that in each matrix the second row is a multiple of the first. The matrix product then has the form:

$$\begin{bmatrix} a_1 & a_2 \\ ma_1 & ma_2 \end{bmatrix} \cdot \begin{bmatrix} b_1 & b_2 \\ nb_1 & nb_2 \end{bmatrix} = \begin{bmatrix} a_1b_1 + na_2b_1 & a_1b_2 + na_2b_2 \\ ma_1b_1 + mna_2b_1 & ma_1b_2 + mna_2b_2 \end{bmatrix}$$

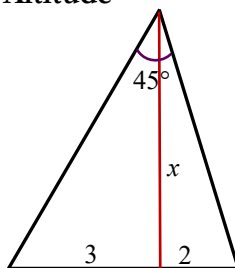
To make the entries on the right all zero, we must have

$$a_2 = -\frac{a_1}{n}$$

For example

$$\begin{bmatrix} 2 & -1 \\ -6 & 3 \end{bmatrix} \cdot \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix} = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$$

2. Altitude

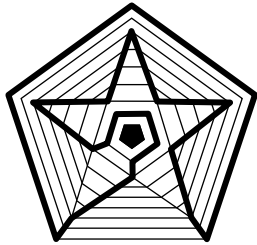


Find the altitude, x .

Split the angle at the top of the triangle into α and $45^\circ - \alpha$. Then, $\tan \alpha = 3/x$ and $\tan(45^\circ - \alpha) = 2/x$. From the second equation we obtain $2/x = (\tan 45 - \tan \alpha)/(1 + \tan 45 \tan \alpha) = (1 - \tan \alpha)/(1 + \tan \alpha)$.

After substituting from the first equation we find $2/x = (1 - 3/x)/(1 + 3/x)$.

So, eventually, $x^2 - 5x - 6 = 0$, which gives the positive solution $x = 6$.



**NEWSLETTER OF THE CANBERRA
MATHEMATICAL ASSOCIATION INC. INC**

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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
Vice President	Aruna Williams
Secretary	Valerie Barker
Treasurer	Jane Crawford
Membership Sec.	Paul Turner
Councillors	Peter McIntyre
	Theresa Shellshear
	Heather Wardrop
	Andrew Wardrop
	Yuka Saponaro
	Jo McKenzie
	Bernadette Matthew

Radford College

Erindale College

Covenant Christian School

University of NSW Canberra

Australian Catholic University

Melba Copland Secondary School

ACT Education Directorate

Mother Teresa School



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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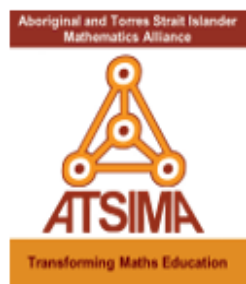
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AAMT POSITION PAPER

[Pedagogy in Mathematics.](#)

In the latest [Strength-in-Numbers](#) podcast, Allan Dougan and Catherine Attard discuss the recently released position paper.

COMMITMENT STATEMENT



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.

CORROBOREE 2000

It is 25 years since 250 000 people walked across the Sydney Harbour Bridge in support of Indigenous reconciliation.

An article in [The Conversation](#), by Professor Heidi Norman and researcher Anne Maree Payne, gives a concise account of what has developed since.

Embedded in the article is a [YouTube](#) video about the 1997 Bringing Them Home report. In its 30 minute duration the video goes a long way towards explaining what Aboriginal people have been (and often still are) up against, not least in their experiences of education. The consequences of taking the children away persist. Click on the links.

ATSIMA CONFERENCE

ATSIMA's [biennial conference](#) will be held 1–3 October 2025 on (Lunawuni) Bruny Island, (Lutruwita) Tasmania.

The theme is: *palawa kani pumili waranta rrala* Our Language Our Strength.

‘...As mathematics educators, we need to ensure that we value language within the teaching and learning of mathematics.’

NAIDOC

From Belco Arts: NAIDOC in the North is a celebration of Aboriginal and Torres Strait Islander Culture through story, song, art, dance and ceremony.

