

SHORT CIRCUIT

Canberra Mathematical Association Inc.

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NEWS AND COMMENT

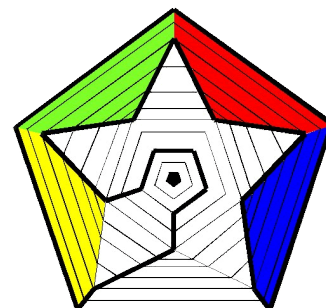
The Canberra Mathematics Talent Quest is on. See page 6 or the CMA website for more information.

Note that the date for entries has changed and that there is now a way provided for submitting entries.

Thanks are due to Peter Fox of Texas Instruments for his article beginning on page 2. His company is in the business of selling calculators but, as he explains, any brand will do equally well for the activities he describes.

Teachers of aspiring mathematicians who are currently in Year 11 are urged to remind potential candidates about the 2026 National Mathematics Summer School.

Applications for the NMSS are due by the end of August. Details may be found below the puzzles on page 4.



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
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ESCAPE ROOMS

From Peter Fox, Texas Instruments

The Power of Escape Rooms in mathematics - Prime Vault



In an age of ever-diversifying educational tools, one constant remains: students thrive when they are engaged, challenged, and given the opportunity to retrieve and apply knowledge in meaningful contexts. The Prime Vault activity series, a free virtual mathematics escape room, was created with these principles at its core. The activity immerses students aged 12–15 in a gamified environment where they must apply their understanding of prime numbers, factors, multiples, and number properties to unlock digital “rooms”. Each room requires students to recall prior knowledge and practice skills, reinforcing their learning through purposeful retrieval practice. Prior to obtaining access to each room, students must first solve a riddle.

Example:

Riddle Introduction

Another link for you to follow,
This gentleman’s riddle is hard to swallow.
His age at the end followed by the start
Will allow you to continue onto the next part.

Students are provided with this introductory text so they know what to do with their riddle solution. The ‘link’ reference refers to the URL for the next video. The riddle solution is used to unlock the next activity/room, “allow you to continue”.

Riddle:

For six years in a row, the man exclaimed:
My age divided by my grandchild’s is integer framed.
No remainders, no tricks, no divide gone wrong.
How old am I? Come, think along!

Like all good escape rooms, participants need to recall previous clues. In this case, the completed Eratosthenes sieve will prove helpful. For ‘six years in a row’ the Grandfather will be a multiple of the grandchild’s age. Can you find six composite numbers in a row? If not, how is this possible?

The answer to the riddle is “*the age at the end*” of the six consecutive years, “*followed by [his age] at the start*”. The answer is a four digit code. The four digit code is used to unlock the next room. How does the answer ‘unlock’ the room? The activity sheets are protected and require a code to be entered: P V # # # # .

As students complete each activity sheet a new URL is generated, leading to the next clue and so on.

The activities are not designed to introduce or teach students about prime factorisation, highest common factor, lowest common multiple and so on, instead, the activities are designed as a powerful revision tool, much more engaging than traditional revision. Furthermore, the type and structure of the revision are what make the activities more powerful. There is a significant difference between re-reading and retrieval!

Retrieval practice, recalling information from memory, has been shown to be significantly more effective than passive review or re-reading (Roediger & Karpicke, 2006). Moreover, when retrieval is spaced out over time and varied in format, as in the sequential nature of an escape room, retention is further enhanced (Agarwal, Roediger, McDaniel, & McDermott, 2014). Equally important is the role of novelty and emotional engagement in learning. Neuroscientific studies suggest that novel experiences activate the brain’s dopaminergic system, which can enhance memory consolidation and motivation (Fenker, Schott, & Düzel, 2008). By transforming routine mathematical practice into a mysterious narrative-driven challenge, Prime Vault taps into students’ natural curiosity and intrinsic motivation.

The format offers valuable opportunities for collaborative problem solving, where students can share strategies and develop metacognitive awareness, all while engaging with important curriculum concepts in an unexpected way. Feedback from teachers indicates that students show increased persistence, more discussion about mathematical ideas, and improved recall of previously taught content when participating in these activities.

What next?

Watch the video:

- Click on the Prime Vault graphic, or
- Scan the QR code, or
- Type in the URL directly:

<https://youtu.be/5vrlNAwipHU>, or

- Search YouTube for “Prime Vault Escape Room”.

If you think your students might be interested, send me an email: p-fox@ti.com and I will email you the entire series complete with teacher notes and student worksheets. It’s completely free! The activity series will also be available from the Texas Instruments Australia website in the coming months.

Comments:

You will notice that the first video includes some calculator instructions. It is up to the individual teacher/student as to whether or not a calculator is necessary or appropriate. In the first activity it is used to help ‘skip’ counting for those students that may struggle for example with their ‘7 times’ tables as they complete Eratosthenes’ sieve. In many cases, questions on the worksheet are designed to negate the use of a calculator.

Example: Students might use the prime factorisation command on their calculator to find the prime factorisation of say $36 = 2^2 \times 3^2$, but not all the factor trees require the final factorisation, sometimes they need to fill in the gaps, which means they must know more than just the prime factorisation!

CORRESPONDENCE

From Peter Taylor, CMA Life Member, responding to the article on AI in the June edition of Short Circuit.

“That’s a really interesting story from one of my well-remembered students at what was then CCAE. Hello Ed!

“I run a trivia team in the Ainslie Football Club on Thursday nights and their Sydney organisers always send me one of the following week’s questions. I always look them up as asked and Google always retorts with number one response by a web site called AI Overview which responds with plausible looking answers and on two recent occasions I knew they were wrong and the Sydney organisers confirmed this with me immediately. It seems we should be careful using AI.

“It seems AI Overview is some organisation either paying Google for priority or a company owned by Google directly, and the staff are not sufficiently thorough.”

ANU WORKSHOP

Topological methods for time-varying data: theory and applications (Top Time). Monday, 27 Oct 2025, 9am - Friday, 31 Oct 2025, 5pm

Topological Data Analysis (TDA) is a research area at the intersection of Algebra, Topology, Geometry, Statistics and Machine Learning.

While methods from TDA have been applied successfully to data from a variety of domains—financial mathematics, materials science, climate science, biomedical imaging, social science,—the goal of this workshop is to bring together experts in TDA with experts in domains in which time-varying data is particularly prevalent.

Examples include time series in climate modelling and financial mathematics, as well as dynamic networks in epidemiology and social science modelling. Find out more on the ANU [webpage](#).

PUZZLE SOLUTIONS from [Vol 16 No 7](#)

1. Age difference

Isaac Greenwood's 1729 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 just as old again [i.e. twice as old] as the *Other*. How old was each of Them when they married?'

Greenwood's book gives a procedural solution that does little to help a student's understanding of the general problem. Algebra, although mysterious at first, addresses this need. But, first, the difficulty of translating from natural language to algebra has to be faced. (In this way, English and Mathematics are not unrelated.)

Let x stand for the age of the *One*, and y for the age of the *Other* at the time of their marriage. Then $x = 3y$. After fifteen years is added to their ages, we have $x + 15 = 2(y + 15)$. By substitution or otherwise, $x = 45$ and $y = 15$.

2. Sums of two squares

Explain why no odd prime number that is one less than a number divisible by four can be expressed as the sum of squares of two integers.

Odd numbers are either one more or one less than a number divisible by four.

For an odd number to be the sum of two squares, one square must be odd and the other even. Even squares are always divisible by four and odd squares are always one more than a number divisible by four.

Thus, their sum must be one more than a number divisible by four. So, no number that is one less than a multiple of four can be the sum of two squares.

PUZZLES

1. Egypt

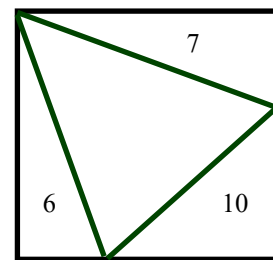
A scribe, Ahmes, in Ancient Egypt copied onto papyrus a text showing fractions expressed as sums of distinct unit fractions. For example, the fraction

$9/10$ can be written as $1/2 + 1/3 + 1/15$, or as $1/2 + 1/4 + 1/8 + 1/30$, or as $1/3 + 1/4 + 1/5 + 1/12$, and so on.

What fractions, all different, are needed to make a sum adding to $10/11$?

2. Geometry to algebra

The side of the square and the area of the central triangle are to be found. The areas of the three triangles in the corners of the square are respectively 7, 10 and 6 units.



3. Factorial

Factorials increase rapidly. But, for not too large numbers, the number of decimal digits in each factorial grows only slightly faster than the factorials themselves.

There exist three distinct numbers, each of which is equal to the number of decimal digits in its factorial. Find them.

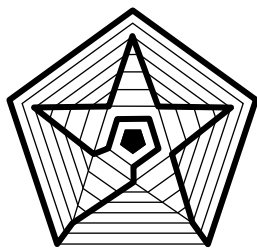
NMSS 2026

The National Mathematics Summer School 2026 will take place from 4 to 17 January. The school is set to run as usual at the Australian National University, with all students and staff in residence on campus.

On the [NMSS](#) website there is a new centralised, online application form. The [application](#) process has opened for students currently in Year 11.

The application deadline has been set to Friday 29 August.

Queries from students, parents or teachers, may be sent by email to the NMSS director, Professor Norm Do at admin@nmss.edu.au.



**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

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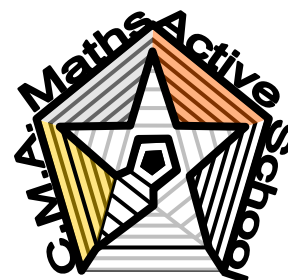
University of NSW Canberra

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.



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A BIG PICTURE

Over recent months, this publication has on a few occasions pointed readers to writings by education commentator Dean Ashenden. Here is another such reference: [How to disappear a problem](#) from Inside Story 10 July 2025.

Ashenden tells of a policy concerning the three sectors that was adjusted by the Whitlam government, with consequences that have evolved since. Click on the link to find out what Ashenden has to say on the matter.

It is worth noting that Ashenden's article does not seek to prioritise or favour any one sector over the others, nor does Short Circuit. Our readers work in all three sectors.

Here are some tasters:

'... the Catholics and the privates had been cut off without a public penny by the "free, compulsory and secular" movement of the late nineteenth century.'

'... residual institutions...'

'... schools of last resort ...'

'... Karmel's warnings ...'

'... fixing the whole system ... no traction.'

'The disadvantaged were going to school with other disadvantaged kids, the advantaged to schools for the advantaged.'

'... a riddle: what did the rich kid say to the poor kid? Answer: nothing, they never met.'

'... construed segregation not as a problem for all students or for the wider society but as a problem for "the disadvantaged."'

While the topic may have little immediate relevance for the classroom, many teachers are likely, nevertheless, to care about the not-so-obvious impacts of education policy.

In this case, we are encouraged to care not only about local academic outcomes but also about the subtle yet real effects on the whole of society.

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.

See the CMA webpage or click this [link](#) to get the details.

The submission date for entries has been put back by two weeks.

The new due date is **Monday 1st September**. Entries can be sent to Andy Wardrop's email:

andrew.wardrop20@gmail.com

or to the CMA [email](#).

TAX, SUPER AND YOU

The Australian Taxation Office (ATO) [Tax, Super + You competition](#) is now open. Students in Years 7-12 (including Australian home school students) are invited to participate.

AAMT POSITION PAPER

In a [Strength-in-Numbers](#) podcast, Allan Dougan and Catherine Attard discuss the position paper, [Pedagogy in Mathematics](#).

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.'