SHORT CIRCUIT

Newsletter of the Canberra Mathematical Association INC

VOLUME 14 NUMBER 1 JANUARY 2023

NEWS AND COMMENT

A happy New Year to all our readers.

CMA Conference 2023: Save the date—March 18.

Coming Events:

CMA Conference 2023

Saturday March 18 at ADFA.

Since CMA is turning 60 in 2023, the conference theme will be ***All About Sixty.***

If you would like to be a presenter, send us an email.

canberramaths@gmail.com

MEMBERSHIP

Memberships run from 1 Jan to 31 Dec. each year. Membership forms are on the CMA website: http://www.canberramaths.org.au

Membership of CMA includes membership of the Australian Association of Mathematics Teachers and a subscription to one of two AAMT journals.

Members receive a one-third discount for the CMA conference and attractive rates for CMA professional development events.

CMA members may attend conferences of the AAMT affiliates in other states, at member rates.

Inside:

CANBERRA MATHEMATICAL ASSOCIATION

PUZZLES

1. Possible?

Suppose $\dfrac{5^x}{1+5^x} = \dfrac{2}{5}$

Find $\dfrac{125^x}{1+125^x}$

What kind of a number must x be, and do we need to know?

2. Impossible?

The infinite tower of powers $x^{x^{x^{x^{\cdots}}}}$ should be understood as a sequence

$\{x,\ x^x, x^{x^x}, \ldots\}$

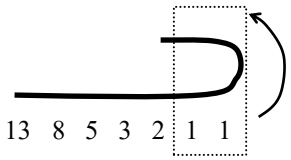
Are there any values of a for which the expression $x^{x^{x^{x^{\cdots}}}} = a$ makes sense?

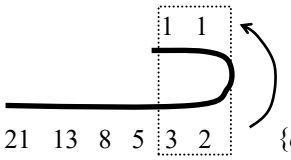
For example, is there an x such that

$$x^{x^{x^{x^{\cdots}}}} = 2$$

3. Conveyor belt

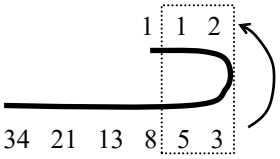
Explain this:



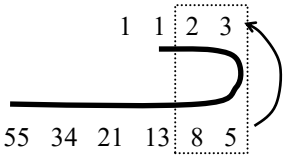


$\begin{matrix} a & b \\ d & c \end{matrix}$ = $\begin{matrix} 1 & 1 \\ 3 & 2 \end{matrix}$

$\{ad, 2bc, ac + bd\} = \{3, 4, 5\}$

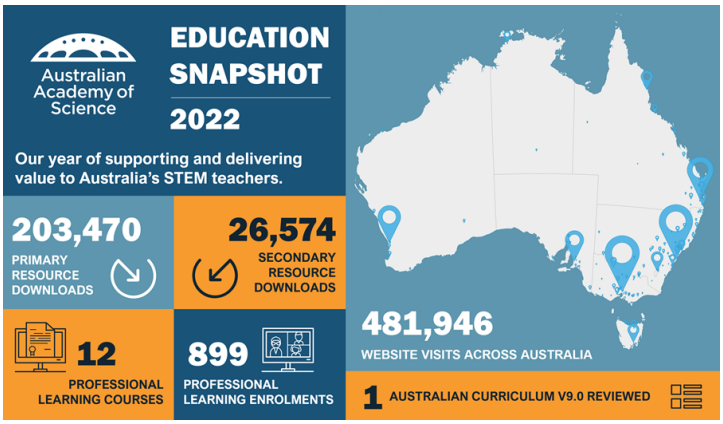


{8, 12, 13}



{16, 30, 34}

We'd like to share a 2022 snapshot from the Australian Academy of Science education programs: reSolve, Primary Connections, and Science by Doing.



Our focus for 2023 will be on developing **new digital teaching resources for AC V9.0** with **embedded just-in-time professional learning** to support teaching and learning of mathematics and science from Foundation to Year 10.

Our programs will remain free for users to access and use, supported by the Australian Government Department of Education.

The current 8.4-aligned websites for reSolve, Primary Connections and Science by Doing will be maintained while AC V9.0 is implemented across Australia.

Our AC V9.0 suite is being informed by our comprehensive review of the AC and consultation with teachers, systems and sectors. As always, our teaching and learning resources and professional learning offerings will be research-informed and evidence-based with expert input from academics.

reSolve Short Summer Courses

These are **abridged, unfacilitated** versions of the professional learning courses we offered in 2022, and will be **open from mid-January to mid-February 2023.** They take 2 hours to complete and require no classroom practice, unlike our regular courses.

COURSE 1:

The active role of the TEACHER

COURSE 2:

TASKS that promote reasoning & problem-solving

COURSE 3:

A sense-making classroom CULTURE

mbi@science.org.au

PRIME MINISTER'S SCIENCE AWARD

CMA Vice President Bruce Ferrington was recently short listed for the 2022 Prime Minister's Science Award for his work with maths teaching around Canberra and for the miniMaths (Maths In Nature Inquiries) Project for preschools. Bruce was nominated for the award by CMA President Aruna Williams and supported by Sue Wilson (CMA) and Andy Gordon (Head of Junior School, Radford College).

At the awards dinner held at Parliament House on 21st November, the eventual winners were announced, with Mr George Pantazis of Marble Bar Primary School in WA winning the Primary Teacher category for his work with science teaching in a remote indigenous community.

The awards are held annually. If you know a teacher who is doing commendable work in maths or science, consider nominating them in recognition of what they do.

Pictured (l to r) – Andy Gordon, Bruce Ferrington, Sue Wilson, Aruna Williams

WORK IT OUT

$$x^4 - \frac{9869^2 + 11930}{10^6} = 0$$

This quartic equation may have been invented by Srinivasa Ramanujan. We are not sure. The positive real solution is deceptively close to a well known number, but it is certainly an approximation.

NEWSLETTER OF THE CANBERRA MATHEMATICAL ASSOCIATION 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 2023 CMA COMMITTEE

President	Aruna Williams	Erindale College
Vice Presidents	Bruce Ferrington	Radford College
	Jo McKenzie	ACT Education Directorate
Secretary	Valerie Barker	
Treasurer	Jane Crawford	Brindabella Christian College
Membership Sec.	Paul Turner	
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	Theresa Shellshear	Australian Catholic University
	Heather Wardrop	
	Andrew Wardrop	
	Sue Wilson	
	Yuka Saponaro	Amaroo School
	Joe Williams	
	Matthew Millikin	Marist College
	Roisin Boadle	Erindale College

Theresa Shellshear is CMA's COACTEA representative.

Sue Wilson is CMA's AAMT representative.

Joe Wilson is the website manager.

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Find us on Facebook

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

CAREERS AND MATHEMATICS

From Frances Moore

Careers & Mathematics can be found at

https://onthejob.education/teachers_parents/Mathematics_Teachers/Careers_Mathematics_Index.htm

Let's have a look at the Bioinformatics Scientist.

Context and relevance: Since the pandemic, we have been bombarded with statistics about COVID. The Bioinformatics Scientist's job is at the heart of these numbers – their analysis and implication. But not just COVID but foot & mouth disease; the work of pharmaceuticals; and, the sequencing of genomes across the world.

Activities for the Classroom:

Activity 1: Bioinformatics: Food Detective

M Middle H Secondary

This lesson was developed by the University of Edinburgh for students studying Biology in Years 8 – 12. It entails getting the students to learn about DNA barcoding where specific DNA sequences are used to identify different species. The big question is whether pork sausages are 100% pork or not!

Activity 2: Sequence Bracelets

P Primary

Students are presented with different species genomes. They are given the sequences and have to then match the chemical bases (A-T or C-G) in a bracelet. This activity relies on concentration.

Activity 3: This activity involves research: The Koala Genome Project – a Listening and Viewing Research Project and is suitable for Biology students. This activity does not directly involved mathematics.

Activity 4: Cladogram including a Minion classification.

This is a reasoning activity. Students are given information and they have to work out the relationships between the groups of animals or "things". It is linked to an extended unit of work on Classification (8- 12 lessons).

Activity 5: Bioinformatics practical: the Florida Dentist

This practical is based on a true story about a Florida Dentist accused of infecting his patients with HIV. Students retrieve and align nucleotide sequences and build phylogenetic trees to determine if "he done it"! This is a reasoning activity.

Contact Information

If you are investigating an aspect of mathematics or would like information about a person in that job, please contact me Frances Moore – I would be happy to hear from you.
Frances.Moore@onthejob.education

Mob 0410 540 608

PUZZLE SOLUTIONS from Vol 13 No 12

1 After Alice

A problem that kept Charles Dodgson (the author Lewis Carroll) awake on the night of 19th December 1897, was to find a set of three right angled triangles that had integer sides and equal areas. He found a pair of such triangles, (20,21,29) and (12,35,37), but could not produce a set of three. Dodgson died less than a month later, a failure in this tiny respect.

It turns out that the smallest area of three such triangles is 840. Can you find them?

The pair of right triangles that Dodgson found have areas 210. The clue that the area of the required triangles is 840 suggests that we might double the sides of the given triangles to get triples (40, 42, 58) and (24, 70, 74).

Now, starting with (40, 42, 58), we can obtain further triangles with the same area in the form ($40b/a$, $42a/b$, …). But, as well, the third number is required to complete a Pythagorean triple.

For example, if $a/b = 3/5$, we obtain the other triangle (24, 70, 74).

A search through the possibilities (limited by the numbers of divisors of a and b) eventually reveals, with $a/b = 3/8$, the triple (15, 112, 113).

2 Domino

A domino has from 0 to 6 spots on each end. How many different dominos are there?

Count the dominos that have n spots at one end and no more than n at the other, for
$n = 0, 1, 2, \ldots, 6$.
The sum of these is $1 + 2 + \ldots + 7 = 28$.