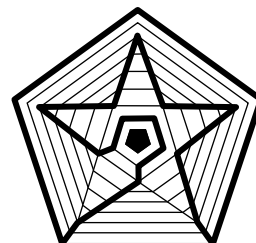


SHORT CIRCUIT

Newsletter of the Canberra Mathematical Association INC

VOLUME 11 NUMBER 1

FEBRUARY 2020



NEWS AND COMMENT

While the subject ‘mathematics’ is precise and logical, its pedagogy is full of uncertainty. There are competing opinions, not always well founded, about how mathematics should be taught in schools. The publication of the PISA results has stirred up just such expressions of opinion, often lacking precision or logic, or both.

As practitioners in mathematics, we surely have a responsibility to ask for clarity and sound reasoning in any pronouncements about how children should be educated.

It seems fair to expect a high standard of opinionizing even in mere press releases. For example, among some worthy remarks, the [Australian Mathematical Sciences Institute](#) called for measures to ‘...strengthen the primary and secondary teacher workforce’.

One must ask what the verb ‘to strengthen’ means in this context and what such a program might look like.

The response from the [AAMT](#) was relatively more thoughtful, comparing experiences in Singapore and the UK with observations in some local schools. One hopes that the AAMT

piece will be read at least twice by people of influence. It is not the kind of writing designed for a thirty second news item.

A difficulty lies in understanding what the PISA results really show. News media tell a simple story of woe about slippage down a performance rank. Mathematics learning is presented much like a World Cup Soccer competition. It may be that our students *are* poor at maths, but a ranking does not prove it.

The published scores come from scales transformed to approximately normal distributions with means around 500 and standard deviations about 100. Thus, 2/3 of them *must* be near the OECD average whatever real skill levels they reflect. PISA purports to differentiate between students on a finely graduated scale, albeit with hardly credible validity.

Whatever the eventual response by Australian educational authorities, it is to be hoped that it will involve the full text of the [PISA report](#), not just the headlines, read carefully, calmly and honestly.

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PISA – p. 3 (Sue Wilson)

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Coming Events:

Welcome drinks: 21 February, 4-6 p.m.
(ACU—to be confirmed)

Maths300 workshops—to be advised.

CMA conference: 22 August 2020.

CMA AGM: 11 November, 2020.

Wednesday Workshops:

To be advised.

MEMBERSHIP

Memberships run from 1 Jan to 31 Dec. each year. **Renewals are now due.**

Membership forms can be accessed from the CMA website:

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

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

As a member, you are entitled to attractive rates for the CMA annual conference and CMA professional development events.

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

**CANBERRA
MATHEMATICAL
ASSOCIATION**

PUZZLES

1.

What is the benefit to a green plant in producing oxygen by photosynthesis from carbon dioxide? How much oxygen might green plants return to the atmosphere from 1 kg of carbon dioxide? How much oxygen is removed from the atmosphere by the complete combustion of 1 kg of anthracite?

2. What goes wrong here?

$$\begin{aligned} \sqrt{-1} &= \sqrt{-1} \\ \sqrt{\frac{1}{-1}} &= \sqrt{\frac{-1}{1}} \\ \frac{\sqrt{1}}{\sqrt{-1}} &= \frac{\sqrt{-1}}{\sqrt{1}} \\ \sqrt{1} \cdot \sqrt{1} &= \sqrt{-1} \cdot \sqrt{-1} \\ 1 &= -1 \end{aligned}$$

3.

Find a square rational number that remains a square when it is increased by 5 or decreased by 5. (Emperor Frederick II is said to have put this question to Fibonacci in 1225.)

In Short Circuit Volume 10 Number 3, we asked whether the equation $x^3 + y^3 + z^3 = 42$ could be solved in integers. The question has now been answered by Professor Andrew Booker of the University of Bristol (independently of Short Circuit).

$$42 = (-80,538,738,812,075,974)^3 + 80,435,758,145,817,515^3 + 12,602,123,297,335,631^3$$

See the November 2019 issue of [Quanta magazine](#) for more on sums of three cubes.

MATHS300

A team of 13 teacher volunteers, assisted by four CMA councillors, recently reviewed five Maths300 lessons in a workshop and substantially completed rewrites of four of them.

This work will continue in Term 1 of 2020 possibly with the help of Charlie Lovitt, an originator of the Maths300 project.

More news on this will follow.

AAMT

The professional associations of mathematics teachers in each Australian state and territory are affiliated with the Australian Association of Mathematics Teachers.

Membership of AAMT is automatic on joining one of the local associations, such as CMA.

Benefits for AAMT members include resources accessible via the AAMT website. The journals *Australian Primary Mathematics Classroom* and *Australian Mathematics Education Journal* are published by AAMT and are distributed to members.

Download a complete PDF catalogue of resources sold by AAMT from www.aamt.edu.au/Webshop/Catalogue.

CMA members can order items from the AAMT catalogue at a discount.

AAMT has five [Connect with Maths](#) online communities teachers can join.

[Make it count with Indigenous Learners](#) community

[Early Years Learning in Mathematics](#) community

[Maths in Action \(Applications and Modelling\)](#) community

[Engaging All Students](#) (Catering for Diversity) community

[Digital technologies for Mathematics](#) community.

Also visit <http://topdrawer.aamt.edu.au> AAMT Top Drawer Teachers website.

ANU—INTRODUCTION TO ACTUARIAL SCIENCE

The Australian National University (ANU) is running a special version of its popular [Introduction to Actuarial Science](#) course for Year 11/12 students in Australia.

The purpose of the course is to provide students considering an actuarial career with an interactive introduction to the profession. As such, it is a perfect fit for high school students who are strong in maths to find out if an actuarial degree would be good university program choice for them.

The course is FREE for all students.

[Click here for more information and to register interest](#)

SHORT CIRCUIT

PISA—RESULTS

The triennial PISA results in mathematics were released last week. Many comments in the media focused on falls in Australia's mean score (to 491) and ranking (to 29th) in mathematics literacy, headlining the worst results in the test's history (since 2003), and seeking to apportion blame for these results.

Much was made of the higher scores of Chinese students (from four major cities) and Singaporean students, with claims these students are up to 3½ years ahead of Australian students.

The PISA test seeks to measure students' ability to use mathematics knowledge and skills to meet real-life challenges.

The results identify the Australian mean score (491 points) and percentages of students in the 6 PISA proficiency levels (1 - 6, with "low", "medium" and "high" achievers represented by levels 1 & 2, 3 & 4, and 5 & 6 respectively).

Of Australian students, 54% met the ACARA National Proficiency Standard (NPS) of level 3 (482 points), 38% were the in the lowest two levels (with an additional 8% below level 1), and 10% attained the highest two levels.

Of the 14,000 students from 740 schools in Australia 843 students from 41 schools were from the ACT. For these ACT students, the mean score was 515. According to the ACER report, 66% attained the NPS, with 15% of students in the highest two levels, 29% of students in the lowest two levels, and 4% below level 1.(with some ACER rounding of totals).

Compared with the Australian trends, the mean score in the ACT has fallen by the same number of points (33) since 2003, with the proportion of high performers down by 13% and the proportion of students who attained the NPS down by 10%.

However, the ACER report shows several ACT results which differ from the Australian trends:

1. Although the mean score is less than the 2003

score, the results in mathematics literacy in the ACT fell until 2015 and then regained 10 points by 2018. There was also a decrease over this time in the percentage of low performers, from 19% to 15%.

2. The ACT demonstrated gender equity, being the only state where girls (516) outperformed boys (514), and equal proportions of girls and boys achieved the NPS.

What do these results mean for us?

Now is the time that teachers traditionally reflect on the past year. Please share your responses to the PISA reports and to the media comments, few of which seem to have been written by practising teachers of mathematics, either at the primary or secondary level.

Please send your comments to the CMA email address: canberramaths@gmail.com.

You might include your responses to the two points above, or to other issues such as the reported impact of classroom disruptions in Australian classrooms (ranking 70th out of 77 countries in the OECD Index of Disciplinary Climate).

The CMA council is especially interested in ways that the organisation could support our teachers of mathematics to build on the positive trends shown in the ACT since the 2015 PISA results.

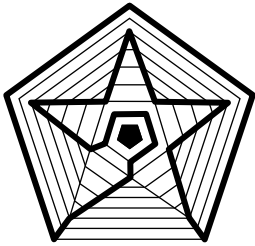
Reference: *PISA 2018: Reporting Australia's Results. Volume I Student Performance* by Sue Thomson, Lisa De Bortoli, Catherine Underwood and Marina Schmid
(Australian Council for Educational Research)

Sue Wilson
CMA Council Member

NATURE PLAY BOOK 2

Congratulations to Bruce Ferrington on the publication of his second Nature Play book, a resource for primary teachers. Free copies will be sent to all ACT pre-schools and Early Learning Centres in January.

Bruce will conduct Mini-Maths workshops soon.



**NEWSLETTER OF THE CANBERRA
MATHEMATICAL ASSOCIATION
INC**

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We're on the Web!

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

THE 2020 CMA COMMITTEE

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Find us on Facebook

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.

Short Circuit is edited by Paul Turner.

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(IM²C) international mathematical modeling challenge

An opportunity for senior secondary students to work as part of a team to solve a genuine, real-world problem using mathematics.

10 March – 27 March 2020

Completely free to enter, and open to all Australian schools, the International Mathematical Modeling Challenge (IM²C) exists to support the real-world application of learning, build proficiency, encourage collaboration, and challenge students to use mathematics to make a real difference to the world around them.

Operating in teams, comprising up to four students from the same school, the IM²C challenges students around the world to work together to solve a common real-world problem by devising and applying an original mathematical model.

By mobilising students in teams, the IM²C replicates real-world conditions, requiring proficiency in mathematics alongside collaboration and contributions from different skill sets, perspectives and methods to achieve overall success.

Working together under the supervision of a team advisor (usually a teacher) for up to five consecutive days between 10 March and 27 March 2020, teams will unpack the given problem, hypothesise, test, and develop a working solution, before preparing and submitting a report on their solution to the Australian judging panel.

Two teams will be chosen to represent Australia in the International phase of the competition, with their solutions competing against others from countries around the world.

For further information and to register, please visit
www.immchallenge.org.au



The International Mathematical Modelling Challenge (IM²C) in Australia is organised and implemented by the Australian Council for Educational Research (ACER), and under the guidance of a national advisory group.





PRE-SERVICE TEACHER PRIZEWINNERS AT 2019 AGM

Matthew Paton (ACU) Jenny Lange (ACU)

Courtney Blanch (UC) Caitlin Mansfield (UC)

GLOBAL MATHS

Global Maths is rolling out a new website design. They hope you love it and find it to be a great resource for uplifting mathematics! It is designed to be easier to use and more valuable to teachers around the world.

Visit globalmathproject.org and tell them what you think.

There is a page just for [teachers](#) with all their math resources in one place.

NEW PhD GRADUATE

Congratulations to Sue Wilson who will have her PhD degree conferred early in 2020, having successfully completed her thesis on Maths Anxiety.

Sue wishes to thank CMA members who have given her support and encouragement over the years of her research.

CMA MEMBERSHIP PACKAGE

All ACT schools will be sent a package from CMA in late January, including a calendar of events for 2020 and an invitation for schools to become institutional members of CMA. Teachers should keep an eye out for this communication and advise their principals of the benefits of membership.

AMSI TEACHER EXCELLENCE AWARD

Congratulations to Thom Mutton of Daramalan College, ACT, on his recognition in the CHOOSEMATHS [Teacher Excellence Awards](#).

Thom is a long-standing CMA member and has taught mathematics for 31 years