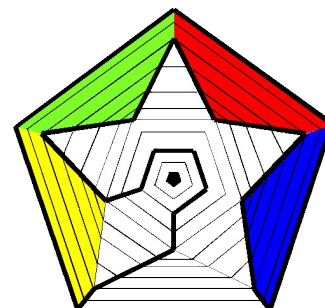


# SHORT CIRCUIT

Newsletter of the Canberra Mathematical Association INC

VOLUME 14 NUMBER 4

APRIL 2023



## NEWS AND COMMENT

NAPLAN came early this year.

Since its introduction in 2008, the National Assessment Program - Literacy and Numeracy has had its detractors as well as its champions. Regrettably, many of us have come down on neither side, not knowing quite who to believe or what, if anything, should be done about it.

In the latest edition of the Australian Mathematics Education Journal (from [AAMT](#)) Rebecca Burtenshaw's article *The collateral of NAPLAN'S false narratives* is a provocative read. (CMA members can subscribe to this journal at no extra cost as part of their membership.)

Burtenshaw suggests that while its intentions were good initially, the NAPLAN data from the beginning have been misunderstood and misused with damaging unintended consequences. It would seem that, as often happens, the attempt to measure something has altered the very thing being measured.

Other useful commentary relating to NAPLAN, from academics in the

field of education, has appeared in the online journal, *The Conversation*. For example,

- [‘Maths anxiety’ is a real thing ...](#)
  - [What do the NAPLAN test changes mean for schools and students?](#)
  - [Five things we wouldn't know without NAPLAN](#)
  - [NAPLAN results inform schools parents and policy. But ...](#)
- and [more](#).

The [media release](#) from ACARA on the 2022 NAPLAN results sets out some upward and downward trends. But, in the absence of credible analysis and of thoughtful explanations for the trends, this information remains open to misuse and amplification by bad actors.

A decade and a half of NAPLAN results has shown that there are deficiencies and dangerous inequities in our education system. What is needed now is surely some few steps beyond questionable measurements and admonitions to try harder.

## Coming Events:

## 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 several benefits of Membership of CMA may be found on the website.

## SHORT CIRCUIT

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 necessarily that you are a current CMA member.

CMA welcomes all readers.

### Inside:

Puzzles – p. 2

Article—p. 2

CMA council 2022 – p. 4

Puzzle solutions—p. 3

**CANBERRA  
MATHEMATICAL  
ASSOCIATION**

## PUZZLES

CMTQ 2023

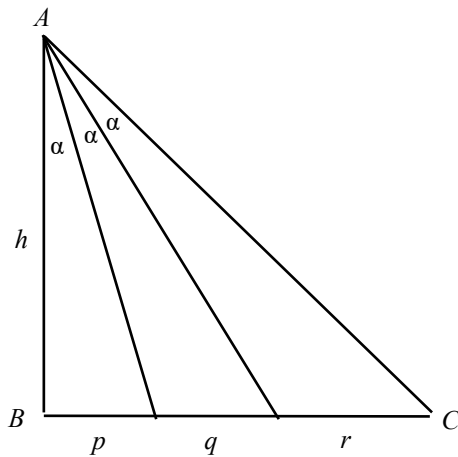
## 1. Impossible?

Without trying to find one, can you show that no solution in real numbers exists for the equation

$$\sqrt{1 + \sqrt{2x^8 + 1}} = x$$

## 2. A nugget

In a right-angled triangle  $ABC$ , the angle at  $A$  has been trisected.



Show that

$$r = \frac{q^2}{2p - q}$$

If  $r = 1$  and  $p = \frac{1}{2}$ , what is the value of  $q$ ?

## 3. Imagine this

There are numbers  $a$ ,  $b$ ,  $c$  and  $d$  such that  $a$  and  $b$  are each 1 more than their respective reciprocals, and  $c$  and  $d$  are each 2 more than their respective reciprocals. Let  $S$  be the sum of the squares of  $a$  and  $b$ , and  $T$  be the sum of the squares of  $c$  and  $d$ . Find the value of  $T/S$ .

## THE CANBERRA MATHEMATICS TALENT QUEST 2023

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.

Students throughout the ACT put considerable time and effort into mathematics assignments and projects and through the CMTQ 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 6 students)
- Be part of a **whole class** entry (7 or more students)

**Entry is free.**

All students from Kindergarten to Year 12 in the ACT are eligible to submit an entry.

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.

We will give you information about submission of entries in April. Due to COVID, entries in most of the states have moved to digital submissions, often using PowerPoint. Entries that win their category are automatically entered in the national competition. Entries in the National Mathematics Talent Quest must be submitted electronically. This is due to the way the entries are evaluated by judges in all the states and territories. Schools can submit up to two entries per category (individual, group or class) per year group to be assessed by an ACT judging panel.

Follow these links to see some examples of student work from Victoria, NSW and WA:

<https://www.mav.vic.edu.au/Student-activities/Maths-Talent-Quest>

<https://www.mansw.nsw.edu.au/student-activities/investigating-with-mathematics>

<https://mawainc.org.au/maths-talent-quest/>

**You can start anytime but the entry date is Monday 7<sup>th</sup> August 2023.**

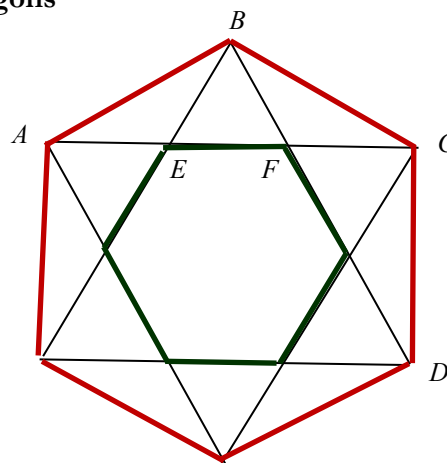
**Updates will be provided in *Short Circuit* and on the [CMA webpage](#).**

## COUNTERINTUITIVE

In a piece for [The Conversation](#), published March 7, 2023, Laureate Professor Jenny Gore of Newcastle University writes on research that has shown that whether teachers had less than one year of experience or had spent 25 years in the classroom, they delivered the same quality of teaching.

## PUZZLE SOLUTIONS from [Vol 14 No 3](#)

### Hexagons



The larger (red) hexagon is regular.

1. How can we be certain that the smaller (green) hexagon is also regular?

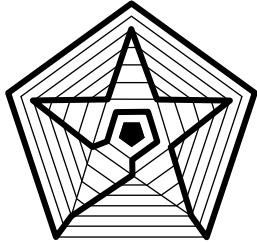
The conclusion feels correct, but to make sure, we can deduce from the regularity of the large hexagon that the large triangles  $ABC$ ,  $BCD$  etc. are congruent. We can then deduce that the smaller and larger obtuse triangles are similar. This means the obtuse angles at  $E$ ,  $F$ , etc. are the same as those at  $A$ ,  $B$ ,  $C$ , etc. After determining that the triangles  $EBF$  etc. on the faces of the smaller hexagon are equilateral, we conclude that the hexagons are similar and so, both hexagons are regular.

2. Imagine circles drawn through the vertices of each hexagon. How do the radii of the circumscribing circles compare?

The ratio of the larger to the smaller radii must be the same as the ratio between any other corresponding distances within the hexagons. For example,  $AB:EF$ . Observe that by the cosine rule,  $AB/AC = 1/\sqrt{3}$ . But, since  $AC = 3.EF$  we have  $AB/EF = \sqrt{3}$ . Hence, the linear measurements in the circumscribing circles are in the ratio  $\sqrt{3}:1$ .

3. If the smaller hexagon has perimeter 6, what is the perimeter of triangle  $ABC$ ?

Side  $EF$  must be 1. So,  $AC = 3$  and  $AB$ ,  $BC$  are each  $\sqrt{3}$ . Thus, the perimeter of triangle  $ABC$  is  $3 + 2\sqrt{3}$ , which is 6.46... .



## NEWSLETTER OF THE CANBERRA MATHEMATICAL ASSOCIATION INC

PO Box 3572  
Weston ACT 2611  
Australia

E-mail: [canberramaths@gmail.com](mailto:canberramaths@gmail.com)

We're on the Web!  
<http://www.canberramaths.org.au/>

## THE 2023 CMA COMMITTEE

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

Theresa Shellshear is CMA's COACTEA representative.

Sue Wilson is CMA's AAMT representative.

Joe Wilson is the website manager.

Short Circuit is edited by Paul Turner.

ISSN 2207-5755

## 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.

Sixty years ago

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.



Find us on Facebook

## CAREERS AND MATHEMATICS

### Careers and Mathematics

... from the website “[On the Job](#)”.

Let’s have a look at the Surveyor. Detailed information about the Surveyor can be found here: [Surveyor - Environments - On The Job](#)

**Context and relevance:** At a recent College Careers Exhibition, people from the Surveying & Spatial Sciences were promoting to students and parents alike the desperate need for more Surveyors and Surveying Technicians. With the advancement of technology, this job is much more than standing around and measuring out with a tape measure. They use equipment, such as laser rangefinder, total stations, robotic total stations, theodolites, GNSS receivers, retroreflectors, 3D scanners, LiDAR sensors, radios, inclinometer, handheld tablets, optical and digital levels, subsurface locators, drones, GIS, and surveying software.

Surveyors work with elements of geodesy, geometry, trigonometry, regression analysis, physics, engineering, metrology, programming languages, and the law.

### Employment Opportunities

Employment growth is strong and results mainly from increased residential, commercial, and civil / infrastructure construction.

Additionally, an increasing number of companies are interested in geographic information and its applications. For example, Geographic Information Systems (GIS) can be used to create maps and information for emergency planning, security, urban planning, natural resource exploration, construction, and other applications.

Job opportunities are expected to be excellent for those with strong GIS skills.

**On the Job Activities for the Classroom:** These activities are to interest students and encourage

them to look, in our case, at the mathematics involved in each particular job.

### Activity 1: Measuring distances using Google maps

This activity gets students to use Google Maps to work out measurements that they would normally encounter – eg. the distance between school and their sporting activity. They are also asked to go to Google Earth – Education to select one of the activities shown there – Gridlines in Earth with Carmen Sandiego; Immersive Global Imagery; and, Timelapse.

### Activity 2: How ancient Babylonian land surveyors developed a unique form of Trigonometry – 1000 years before the Greeks.

Using an article from The Conversation – 5 August 2021, students are to investigate the facts and figures of the Babylonians developing a unique form of trigonometry and challenging the idea that the Greeks were the initial inventors. They use the Retrieval Chart Strategy to summarise the data and hone their presentation and communication skills by explaining to another group what they have learnt.

### Careers & Mathematics can be found at

[https://onthejob.education/teachers\\_parents/Mathematics\\_Teachers/Careers\\_Mathematics\\_Index.htm](https://onthejob.education/teachers_parents/Mathematics_Teachers/Careers_Mathematics_Index.htm)

### Contact Information

If you are investigating a job or person in that job, please contact me Frances Moore – I would be happy to hear from you.

[Frances.Moore@onthejob.education](mailto:Frances.Moore@onthejob.education)

Mob 0410 540 608