SHORT CIRCUIT

Newsletter of the Canberra Mathematical Association INC

VOLUME 14 NUMBER 8 AUGUST 2023

NEWS AND COMMENT

Something called *explicit teaching* is in the wind. The words 'explicit' and 'teaching' have, until recently, had simple enough meanings and their combination described what went on in classrooms most of the time.

Now, the organisation Education Services Australia, owned by the state and federal government ministers, is promoting the idea through its arm, the Mathematics Hub, in a collaboration involving the AAMT.

The naïve observer might be forgiven for thinking that a new pedagogy has been discovered, an answer to lagging performances in PISA and the like.

This new idea is so embedded and encrusted in hyperbole that the humble classroom teacher must surely begin to wonder whether their practice has been inadequate from day one, despite their most sincere efforts.

Going a few steps into the Mathematics Hub material, however, we see that the new pedagogy may not be quite such a repudiation of existing practices after all. But, by that point the damage has been done.

The use of the term *explicit teaching* in the public domain certainly feels like a repudiation of something, although what that *something* is remains unclear. Perhaps it is the idea of students learning by exploration and discovery. Whatever the case, it is a straw man.

The expression *explicit teaching* feels like a weapon. It contains an *implicit* criticism of teachers. It deflects attention from the inequities and failures in the education system. It threatens the abandonment of successful practices deemed not to be sufficiently *explicit*.

Thus, mathematics education in schools is subject to drifting opinions, informed or not; to the whims of individuals and consultative bodies operating on the fringes of the business of teaching.

Professional associations including CMA and AAMT need to be wary. *All that glistens is not gold.*

CANBERRA
MATHEMATICAL
ASSOCIATION

Coming Events:

Workshop—Primary:

Namadgi, Saturday 12 August.

(See page 2.)

CMTQ 2023

Details are on the CMA website, and see page 3.

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 that you are a current CMA member.

CMA welcomes all readers.

Inside:

WORKSHOP

Canberra Mathematical Association – supporting all teachers of mathematics

Primary Teachers

Are you looking for some early spring spark to put into your Semester 2 teaching?

Please join CMA on **Saturday 12th August**, from 9.00am – 12.30pm

for a primary focused

Workshops Session

On the program:

'What's your strategy and what does it look like?'

Focusing on mental computation – addition and subtraction

Enrichment and extension – at all levels

Focusing on opening eyes and beating boredom (theirs too!)

Tapping into materials that are already readily available

Focusing on using tried and tested resources and resource banks such as Maths300

Venue: Namadgi School

Morning tea will be provided, and networking opportunities encouraged.

Free for CMA members $20 for Non-members

To register your interest please email

canberramaths@gmail.com.

(and feel free to bring a friend on the day)

VALE ELIZABETH HAZEL LEE

24/07/41 – 18/06/23

Beth Lee was a widely respected teacher of mathematics and an active member of the CMA. Her contribution to the work of the CMA was recognised when she was awarded life membership of the association.

She served a term as president of the association and was the main organiser of the 18th AAMT Biennial Conference *Mathematics: Shaping Australia* in 2001.

She managed the organisation, handbook, proceedings and liaison with the Riverina Mathematics Association which co-hosted the conference with the CMA. The conference was highly successful with over 300 delegates from the states and territories as well as overseas attendees.

She was the senior teacher in Mathematics at Lake Tuggeranong College from 1990 to 1993 and was the Mathematics Consultant for the ACT for several years.

Beth Lee will be remembered as a dedicated teacher, a hard worker and supporter of her colleagues, especially teachers new to the profession.

A. Wardrop

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 now they have a means to get local or even national recognition and encouragement for their work.

Students may participate 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 able 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.

Entries that win their category are automatically entered in the national competition. Entries in the National Mathematics Talent Quest **must be submitted electronically**. 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:

CMTQ 2023 ENTRY DATE

The entry date for the talent quest is Monday 7th August 2023. Please send us an email that gives us the number of entries you wish to submit. For each entry include the year the year group involved and indicate whether the entry is individual, small group or class. Also, for each entry, include the name of the teacher we can contact for any further details. If the entry is not too large it may be sufficient to include it as an email attachment. We will give you instructions for submitting larger entries.

Further updates will be provided in *Short Circuit* and on the CMA webpage: http://www.canberramaths.org.au/

NEWSLETTER OF THE CANBERRA MATHEMATICAL ASSOCIATION INC

PO Box 3572
Weston ACT 2611
Australia

E-mail: canberramaths@gmail.com

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.

60 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.

THE 2023 CMA COMMITTEE

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	Andrew Wardrop	
	Sue Wilson	
	Yuka Saponaro	Melba Copland Secondary 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.

Short Circuit is edited by Paul Turner. **ISSN 2207-5755**

Find us on Facebook

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

CAREERS AND MATHEMATICS

Feedlot Manager. Detailed information about the Feedlot Manager can be found here.

Context and relevance: To get beef on any Australian table it has to go through a process. One of these procedures is to fatten the beef for slaughter. This is where Feedlots come into play.

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: The Feedlot Manager's Working Life: what s/he needs to know: A SWOT Analysis

Students are presented with a detailed article from the Dept of Agriculture & Fisheries looking at the feedlot profitability. They are to analyse the article and write up as many questions as they can after brainstorming. They have to pose at least one mathematical question. As a class, they are to discuss the big question: What does a feedlot manager need to know?

Activity 2: Solid Wastes in the Feedlot – What of it?

Students are given an article from The Meat & Livestock Association Australia about waste management particularly manure in a feedlot. Students are to answer a number of mathematical calculations about the amount of manure produced; how much needs to be taken away; a comparison with the sale of cow manure; and, the overall cost of turning this waste product into a resource.

Careers & Mathematics can be found at

the on-the-job website.

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

Mob 0410 540 608

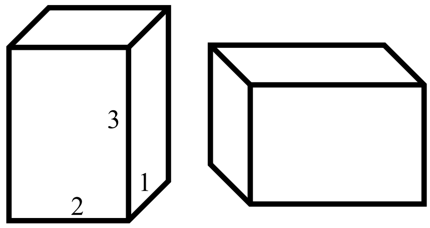
PUZZLES

1 Enough information?

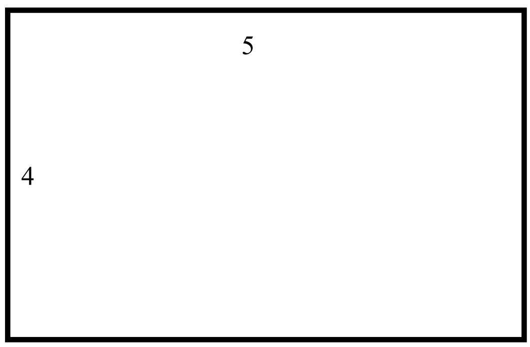
If the area of a right-angled triangle is known, and the length of its hypotenuse, is it possible to determine the lengths of its short sides and the size of the angles? In particular, consider a right-angled triangle with area 2 units and hypotenuse 4 units.

2. Covering

You have a good supply of identical blocks in the shape of rectangular prisms, with dimensions 1, 2 and 3 units.



You would like to arrange blocks, in a single layer, so that they fit into and just cover a rectangle that has been drawn on a piece of paper. The dimensions of the rectangle are 4×5 units



How can this be done?

Can it be done for rectangles with dimensions 3×7, 2×11, and 1×23 ?

[This puzzle has been adapted from an Australian Maths Trust publication from 2005.]

PUDDING AND PI

How I wish I could recollect pi.
"Eureka," cried the great inventor.
Christmas Pudding; Christmas Pie
Is the problem's very centre.

PUZZLE SOLUTIONS from Vol 14 No 7

1. Cryptic

One hundred lots of e on phi,

After substituting numbers for e and φ, we have $100 \times 2.718\ldots \times 2/(1 + \sqrt{5}) \approx 167.999$

A week of hours passes by.

Take this to be a number of hours. Converted to weeks it is 0.999994...

Well, not quite, a fraction shy

This is 1 – 0.999994 = 0.00000595… weeks short of a full week.

But only seconds to report.

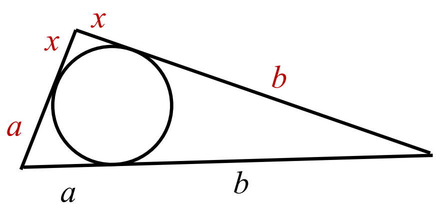
Converted to seconds this is 3.6

How many whole seconds are we short?

which is roughly 4 seconds short of a full week.

2. Incircle

The teacher asks, 'If the letters a and b were replaced by particular numbers, would there be enough information in the arrangement to determine the area of the triangle?'



Some extra labels have been added to the diagram, in red, making use of a theorem about tangents from a point. Then, by Pythagoras, we can write $(a + x)^2 + (b + x)^2 = (a + b)^2$. This is a quadratic in x. It is possible but unnecessary to solve for x as it is really the sums $a + x$ and $b + x$ that are needed for the area. After expanding the squared brackets, we obtain

$x^2 + x(a + b) = ab$ and therefore,

$x^2 + x(a + b) + ab = 2ab$, so that

$(x + a)(x + b) = 2ab$

From this it can be seen that the area of the right-angled triangle is just the product of the segments a and b.

3. Who knew?

On a scrap of manuscript, it is written

…A, B, C are the angles of a triangle, …

$\tan A + \tan B + \tan C \equiv \tan A \,.\, \tan B \,.\, \tan C$

… there is a class of triangles for which it does not apply. What triangles are they? Can you prove the identity for the remaining cases?

The identity is not valid if any of A, B or C are 0° or 90°. To prove it in the remaining cases:

$$\tan A + \tan B + \tan C$$

$$= \tan A + \tan B - \tan(A + B)$$

$$= \tan A + \tan B - \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$= \frac{\tan A(1 - \tan A \tan B) + \tan B(1 - \tan A \tan B) - \tan A - \tan B}{1 - \tan A \tan B}$$

$$= \frac{-\tan A \tan B\,(\tan A + \tan B)}{1 - \tan A \tan B}$$

$$= -\tan A \tan B \tan(A + B)$$

$$= \tan A \tan B \tan C$$

4. Explain this

'To form certain Pythagorean triples, simply cleave the square of any odd number to form two integers of least difference. The odd number and those integers form a Pythagorean triple.'

For example, $7^2 = 49$ and so, (7, 24, 25) is a triple.

Why does this work?

We can make use of two facts:

1. Every positive odd number is the difference between two consecutive squares. (This follows from the fact that all sums of consecutive odd numbers beginning with 1 are squares.)

2. Pythagorean triples are of the form $(v^2 - u^2, 2uv, u^2 + v^2)$.

We can choose any odd number $n = v^2 - u^2 = (v - u)(v + u)$ where u^2 and v^2 are consecutive squares. It follows that $n = u + v$, and so, $n^2 = u^2 + v^2 + 2uv$.

If we partition the square into the parts $u^2 + v^2$ and $2uv$, we note that the difference between them is $u^2 + v^2 - 2uv = (v - u)^2 = 1$.

Thus, starting from n^2, we need only split it into two nearly equal integer parts to find two legs of the triple. The third leg is $v^2 - u^2 = n$.

In the example, $u = 3$ and $v = 4$.