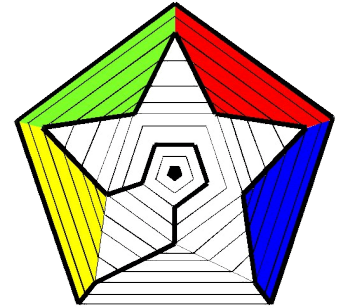


SHORT CIRCUIT

Canberra Mathematical Association Inc.

VOLUME 16 NUMBER 10

OCTOBER 2025



NEWS AND COMMENT

AGM

Members and prospective members of the Canberra Mathematical Association are invited to attend the Annual General Meeting to be held on **Thursday 13th November, 2025.**

The venue will be the **Erindale College** restaurant.

Proceedings, starting around 7 p.m. will be mainly a meal with interruptions for reports, elections and other minor business.

From time-to-time CMA receives requests for help in finding tutors, whether for students who are struggling in their classrooms or for those who need more advanced stimulation.

That tutors are needed at all is something of an indictment of our schools, but accepting that they are sometimes needed, thorny issues arise about how tutors might be found.

The CMA council is considering whether this organisation can be involved in recruiting or recommend-

ing tutors. The idea seems good but there are difficulties.

Many teachers are not permitted, as a condition of their employment, to take on tutoring outside of their schools, and there could be liability issues if things were to go wrong.

Thoughts on this issue from readers would be welcome.

There were nineteen applicants from the ACT for the National Mathematics Summer School to be held in January 2026, for students about to commence year 12.

All nineteen applicants were of an excellent standard such that each might have benefited from attending the school. However, only two could be offered places.

The level of interest in the summer school from ACT schools and students was pleasing. The organisers of the NMSS thank the teachers who encouraged their students to apply and contributed to their applications.

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
ASSOCIATION**

PUZZLE SOLUTIONS from Vol 16 No 9

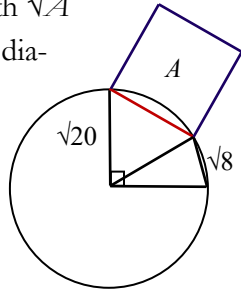
1. Trigonometry perhaps?

Find the area $\mathcal{A}$.

The area $\mathcal{A}$ depends on the length $\sqrt{\mathcal{A}}$ of the chord coloured red in the diagram, which depends on the angle α it subtends at the centre, which depends on the angle β subtended by the $\sqrt{8}$ chord.

With radius $\sqrt{20}$, the cosine rule gives $\cos \beta = 4/5$. This is also $\sin \alpha$. Then, $\cos \alpha = \sqrt{1 - \sin^2 \alpha} = 3/5$.

Finally, using the cosine rule again, $\mathcal{A} = 80$.



2. Wolfram panic

What value of t makes this statement true?

$$2^t = t^{32}.$$

When asked to solve this, the Wolfram website gave an unenlightening solution involving the Lambert W function.

One human solver that we know of converted the statement to

$$\begin{aligned} \frac{1}{t^{\frac{1}{32}}} &= \frac{1}{2^{\frac{1}{32}}} \\ &= 4^{\frac{1}{64}} = 16^{\frac{1}{128}} = 256^{\frac{1}{256}} \end{aligned}$$

So, $t = 256$.

Alternatively,

$$\begin{aligned} 2^t &= t^{32} \\ t &= 32 \log_2 t \\ 2^k &= 32k \quad (\text{Expressing } t \text{ as a power of } 2) \\ k &= 5 + \log_2 k \end{aligned}$$

By inspection, $k = 8$. Hence, $t = 256$.

3. Function notation

Suppose there exists a function f that maps real numbers to real numbers. Given $f(x+y) = f(x)f(y)$ and $f(2) = 5$, evaluate $f(5)$.

Approach 1. Recognise that the exponential function has this property. That is, for some u , $f(x) = u^x$. So,

$$\begin{aligned} u^7 &= 5u^5 \\ \Rightarrow u^2 &= 5 \\ \Rightarrow u &= \sqrt{5} \end{aligned}$$

Hence,

$$f(5) = u^5 = 5^{\frac{5}{2}}$$

Approach 2. The form of the function is not needed.

$$f(4) = f(2).f(2) = 25$$

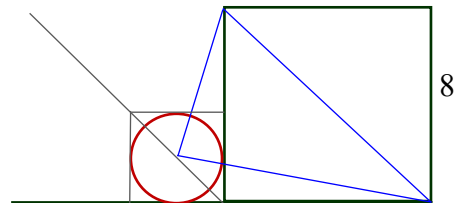
$$f(2) = f(1).f(1)$$

$$\Rightarrow f(1) = \sqrt{5}$$

$$f(5) = f(4).f(1) = 5^{\frac{5}{2}}$$

4. Enough information?

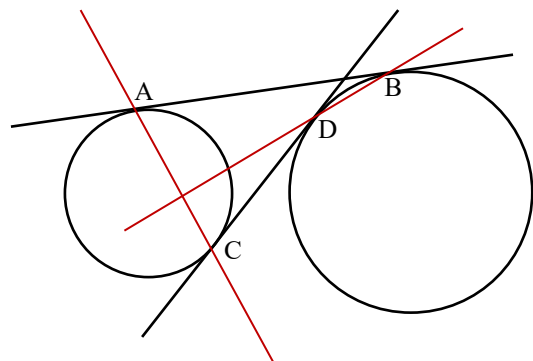
The following diagram shows a square and a circle. Find the area of the blue triangle.



We constructed some lines (in grey). The diagonal of the large square and the diagonal of the small square enclosing the circle must be parallel whatever the size of the circle. Hence, the height of the triangle above the long diagonal as base must be constant, including when the circle has zero radius. So, the triangle has area half the square. That is, 32 units.

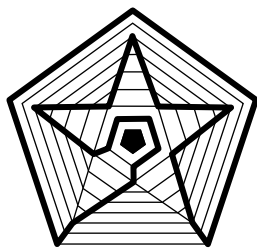
PUZZLE

Tangents



Tangents AB and CD are drawn between two non-intersecting circles. Lines AC and BD pass through the points of tangency A , C and B , D respectively.

The lines AC and BD appear to be at right-angles in the diagram. Argue logically that this must always be the case whatever the sizes of the circles.



**NEWSLETTER OF THE CANBERRA
MATHEMATICAL ASSOCIATION INC. 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.

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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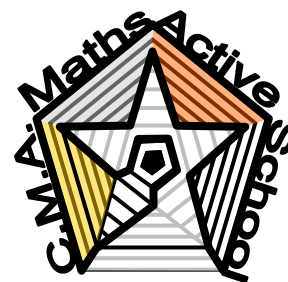
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Theresa Shellshear is CMA's COACTEA representative.

Bruce Ferrington is CMA's AAMT representative.



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