



THE MATHEMATICAL
ASSOCIATION OF VICTORIA

MAV22
CONFERENCE

1 & 2 DECEMBER

VALUING MATHEMATICS IN A CHANGING WORLD CONFERENCE PROGRAM - ONLINE -



59th Annual Conference - Virtual and In Person

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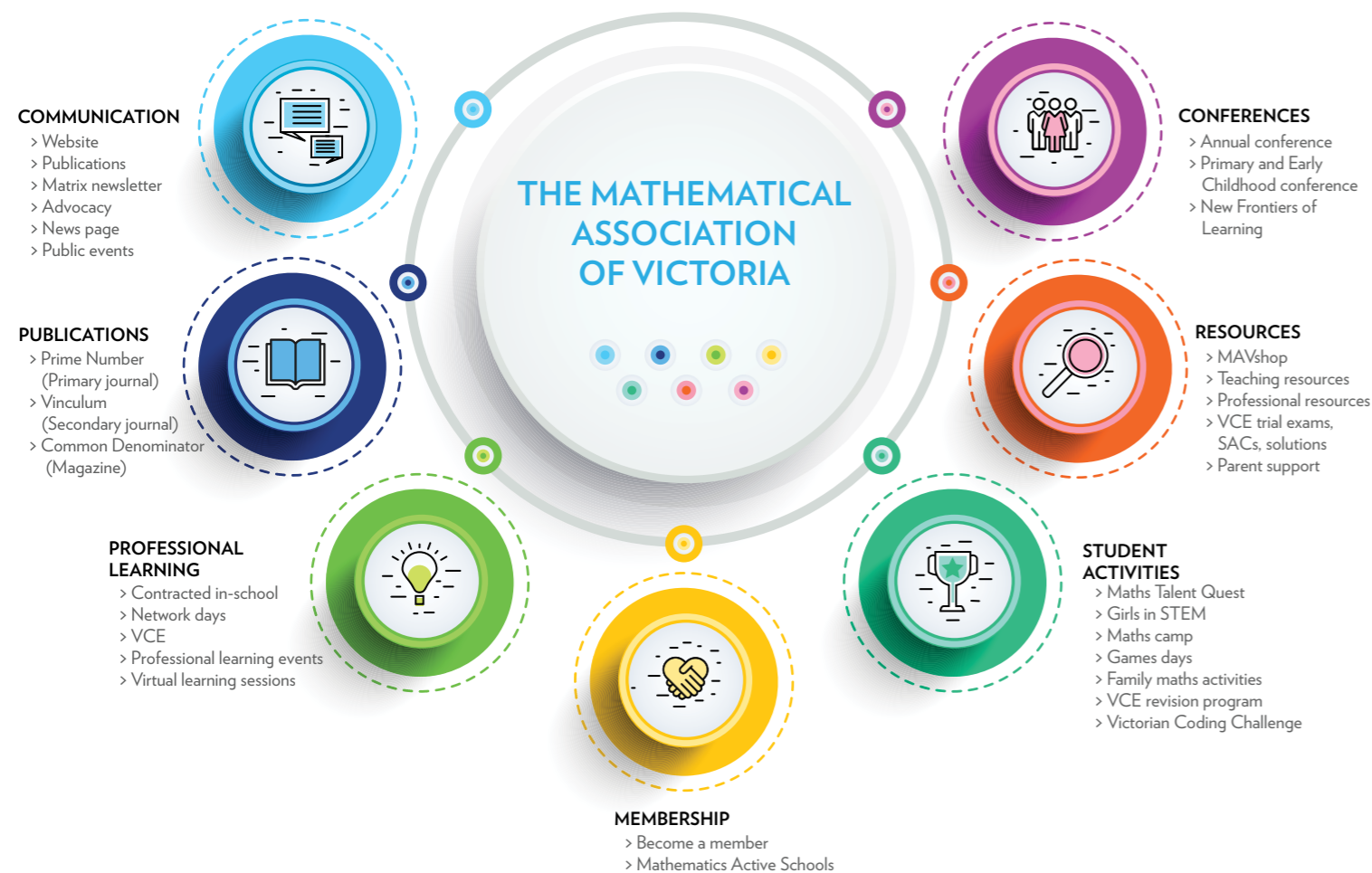


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WELCOME TO MAV22



Welcome to MAV22 – Valuing Mathematics in a Changing World

On behalf of the MAV Board and the conference committee, I invite you to the 59th Annual Conference (MAV22) on Thursday 1 to Friday 2 December 2022.

The theme for MAV22, *Valuing Mathematics in a Changing World*, is timely, particularly given the past two years we have experienced, and that mathematics plays a crucial role in our personal, professional and civic lives. More specifically, mathematics is the foundation for responding to and managing societal issues, such as pandemics, environmental and social problems. In the workplace, mathematics is used every day to communicate, plan, visualise, monitor, evaluate systems and processes, interrogate data and information, and predict outcomes in an increasingly information rich and technologically advanced society.

On a personal level, mathematics is used in a range of contexts and underpins our ability to make informed decisions about personal finance or health, and recreation where numeracy is required for daily life. Algorithmic thinking, often out of sight and out of mind from our day-to-day activities, underpins the new technology we see advancing around us. As educators we want our students, parents and carers, and community to value and connect with mathematics in our fast-paced and changing world. We need to actively engage students and equip them to be problem solvers, and critical and creative users of mathematics now and in the future. This requires educators who are adaptable, innovative and flexible in their pedagogical practices.

After two successful years of online conference, we are delighted MAV22 will be a mix of virtual and in-person sessions. We anticipate over 800 mathematics educators including teachers, academics, policy makers, curriculum experts and resource developers will come together to share their expertise, experiences, and ideas.

Join us either online or in-person to share your ideas, stories, and enthusiasm for engaging in and exploring the different ways we experience and value mathematics across these two days.

- Ann Downton, Conference Convenor

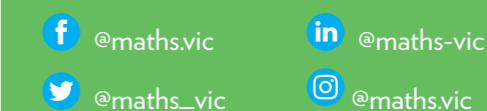
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SCHEDULE

| Thursday 1 December 2022 | |
|--------------------------|---|
| 8am - 9.15am | Registration |
| 9.15am - 10.15am | Keynote presentations |
| 10.15am - 11am | Morning tea (for in-person delegates) Bonus session for online delegates (10.25am-10.55am) |
| 11am - 11.50pm | Sessions |
| 12pm - 12.50pm | Sessions |
| 12.50pm - 1.30pm | Lunch |
| 1.30pm - 2.20pm | Sessions |
| 2.30pm - 3.20pm | Sessions |
| 3.20pm - 4.30pm | Networking drinks |
| 4.30pm | End of day 1 |
| Friday 2 December 2022 | |
| 8am - 9.15am | Registration |
| 9.15am - 10.15am | Keynote presentations |
| 10.15am - 11am | Morning tea (for in-person delegates) Bonus session for online delegates (10.25am-10.55am) |
| 11am - 11.50pm | Sessions |
| 12pm - 12.50pm | Sessions |
| 12.50pm - 1.30pm | Lunch |
| 1.30pm - 2.20pm | Sessions |
| 2.30pm - 3.20pm | Sessions |
| 3.30pm | Conference close |

Stay connected



Your MAV membership is an essential part of a successful career. Renew or join today.

KEYNOTES

Keynotes are available to both in-person and online delegates.

PRESENTERS



GEORGE GADANIDIS

COMPUTER PROGRAMMING IN THE MATHEMATICS CLASSROOM, GRADES 1-9: THE ONTARIO, CANADA, EXPERIENCE

For several years George has been working and researching in grades 1-10 classrooms in Canada, and in Brazil, integrating computer programming within mathematics education. He has also worked with the Ministry of Education in Ontario, Canada, doing background research for reforming curricula and advising curriculum writing teams. They now have in Ontario explicit computer programming expectations within the algebra strand for all grades 1-9. This has affected what mathematics is taught, how it is learned, and who can learn it.

This keynote presentation is supported by



CATHERINE ATTARD

MATHEMATICS EDUCATION: CHANGING TIMES, CHANGING PRACTICES

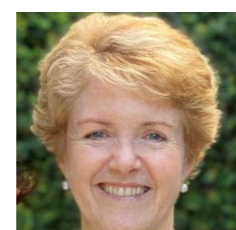
Catherine Attard is Professor in Primary Mathematics Education and Deputy Director of the Centre for Educational Research at Western Sydney University. She is a multiple award-winning educator who has transformed teaching and learning in primary mathematics at Western Sydney University for over 15 years. Her philosophy, while straightforward, is transformative: Catherine combines great dedication for teaching engaging mathematics with her own experiences as a primary classroom teacher to motivate and inspire pre-service and qualified teachers. Catherine's research is focused on student engagement with mathematics and issues surrounding the pedagogical practices that influence students' engagement.

Catherine also researches contemporary teaching practices through the use of digital technologies, and the practices of middle leaders in Australian schools.

Catherine has won several teaching awards, including a 2016 Australian Awards for University Teaching (AAUT) Teaching Excellence Award, an Office of Learning and Teaching

citation for Outstanding Contributions to Student Learning and the Western Sydney University Vice-Chancellor's Excellence in Teaching Award. She regularly presents workshops and keynotes nationally and internationally and is the current President of the Mathematics Education Research Group of Australasia (MERGA), a past president and Life Member of the Mathematical Association of New South Wales (MANSW) (2014-2015), and past editor of the professional journal, *Australian Primary Mathematics Classroom*. Catherine is also the author of the leading mathematics education blog, *engagingmaths.com*, as well as the author of several popular mathematics teacher resource books.

This keynote presentation is supported by



JANETTE BOBIS

PEDAGOGIES TO AMBITIOUSLY ENGAGE EARLY YEARS STUDENTS

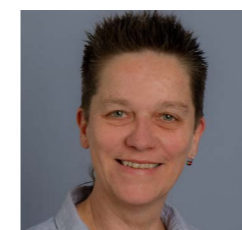
Janette Bobis is Professor of Mathematics Education in the Sydney School of Education and Social Work at The University of Sydney. She was a primary school teacher for over eight years before transitioning to the tertiary sector where she now teaches mathematics education to primary pre-service and inservice teachers. Janette's research and teaching focus on student engagement in challenging mathematics tasks, early mental computational strategies and the enhancement of teacher mathematical knowledge and pedagogy for teaching.

This keynote presentation is supported by



JILL BROWN AND MELANIE O'REILLY

FROM PROBLEM SOLVING AND REASONING → UNDERSTANDING AND FLUENCY



Jill Brown is a senior lecturer in mathematics education at Deakin University. Following on from over two decades teaching secondary Mathematics, she has now been involved in primary and secondary Mathematics teacher education for almost as long. She is interested in mathematical thinking including mathematical modelling and reasoning across all levels of schooling. She has a special interest in using multiple representations, digital technology, and classroom discourse to increase opportunities for deep understanding by all learners.



Melanie O'Reilly is a primary school teacher, passionate about students and learning, particularly Mathematics and English. She has been teaching in state primary schools since 2005 and is currently at Findon PS. She has taught in all primary year levels, but has a love for the early years. She was the whole school mathematics leader for several years, and is currently sharing a 3-4 class.

This keynote presentation is supported by



HAYLEY DUREAU

NIMBLE NETWORKS

Hayley Dureau is a Mathematics teacher and the 2022 Mathematics Master Teacher in the inaugural Teaching Excellence Program at the Victorian Academy of Teaching and Leadership. She has spent this year working with outstanding Victorian Primary and Secondary Mathematics teachers across the Government, Independent, and Catholic sectors. Prior to this, she held the position of Leading Teacher: Head of Student Voice at Mount Waverley Secondary College.

Passionate about enhancing teaching and learning by improving relationships between staff and students, Hayley's work in student voice involved creating systems and opportunities for students to provide professional learning for staff and design feedback tools which teachers use regularly, allowing students to provide feedback and discuss their learning with their teachers.

Hayley is a doctoral candidate (Doctorate of Education) at the Melbourne Graduate School of Education. Her research explores how teachers use feedback from students to inform their practice. She holds a Masters of Instructional Leadership and has undertaken professional learning at the Harvard Graduate School of Education, USA. Hayley has shared her work in Student Voice with educators in Australia, and worldwide.

Hayley has presented to mathematics educators across Australia and to pre-service Mathematics teachers at several universities. She is also a Texas Instruments Teacher Trainer.

Hayley received the 2021 Commonwealth Bank Teaching Award and was awarded the CHOOSEMATHS Outstanding Secondary Teacher Award in 2018 by the Australian Mathematical Sciences Institute. As a recipient of the 2017 George Alexander Foundation Fellowship, she undertook applied research in the area of Student Voice and STEM Education in Denmark.

In 2016 Hayley was named Victorian Department of Education and Training Outstanding Secondary Teacher of the Year. She was a 2016 ACEL New Voice in Educational Leadership Scholar, and in 2015 she was awarded the VicSRC Teacher Advisor Award.

This keynote presentation is supported by





MARILYN FLEER

MOTIVATING STUDENTS IN MATHEMATICS THROUGH CONCEPTUAL PLAYWORLDS AND REALWORLD SITUATIONS

Laureate Professor Marilyn Fler is an Australian Research Council Laureate Fellow and Director of the Conceptual PlayLab at Monash University. She has been a curriculum writer, advisor and mentor to ACARA. From over 20 years of research, she has developed an evidence-based model that supports STEM concept formation in play-based settings and in primary schools. Recently she has been working with an amazing team of teachers on a maths curriculum project at Laburnum Primary School where Foundation to Year 6 students engaged in a Conceptual PlayWorld and RealWorld situations respectively.



SHELLEY HANNIGAN

MATHEMATICS THROUGH AN ARTISTIC EYE

Shelley Hannigan is a Senior Lecturer focusing on pre-service teacher education at Deakin University. She specialises in art education but also teaches units in education studies, art-well-being and creative pedagogies. She is also a practicing artist researching practice-based research and supervising PhD students. Her research also investigates creative practices that can contribute to enhanced learning and well-being, practice-based research and transdisciplinary practices such as arts-health and STEAM. Her recent publications discuss the use of art in teaching and learning science in secondary schools and the important role of aesthetics in this process as well as creativity.

This keynote presentation is supported by



PETER SULLIVAN

PROBLEM SOLVING AND REASONING CAN BUILD MATHEMATICAL UNDERSTANDING AND FLUENCY

Peter has had a career that combines research into task design with the development of teacher support resources and classroom trialling. He was author of the *Shape of the Australian Mathematics Curriculum*, a paper commissioned by the National Curriculum Board to lay the foundation of the Australian curriculum. Subsequently he was appointed the lead writer for the development phases of the curriculum and has supported ongoing development of the documents, including consulting on the review conducted in 2015. He was also the author of the Australian Education Review publication *Teaching mathematics: Using research-informed strategies* that has now been downloaded over 240,000 times from the ACER website.

Peter was editor for seven years, and for three years chief editor of the prestigious *Journal for Mathematics Teacher Education*, published by Springer. He was also editor of the *Mathematics Education Research Journal* published by Springer. He has an extensive list of publications for teachers and researchers including books, books chapters, journal articles and conference publications.

This keynote presentation is supported by



PAUL SWAN

THE VALUE OF WORTHWHILE TASKS AS AN EFFECTIVE PEDAGOGY IN MATHEMATICS: ONLINE AND OFFLINE

Paul Swan works with school leaders and teachers to improve the teaching of mathematics in primary schools. He has written many books and games – many of which are free on his website www.drpaulswan.com.au – to support the teaching and learning of mathematics. More recently he has been working on the development support materials for students requiring intervention in mathematics and help for teachers trying to teach students how to solve word questions in maths.

This keynote presentation is supported by



SECONDARY PANEL

**PETER FOX, ALLASON MCNAMARA
TOM MOORE, RACHAEL WHITNEY-SMITH**

VALUING AND EXPLORING HOW TECHNOLOGY ENHANCES MATHEMATICAL INVESTIGATION AND DISCOVERY.



Peter Fox is passionate about mathematics, education and the way technology can be used to engage, excite and enhance student understanding. Peter taught high school mathematics for 25 years. In his first year of teaching (1990) he wrote machine coded routines that connected a bicycle to a computer so his mathematics and physics students could interact with distance, speed and acceleration - time graphs. He has used data logging, video analysis and interactive media for many years to help motivate and inspire students. Peter has also worked as a project manager at the University of Melbourne, taught DipEd students at Monash University, worked on VCAA course review and examination panels, provided resources and professional development in various regions around the world as they move to incorporate a range of technologies in the mathematics classroom. Peter works with Texas Instruments providing professional development, website and product development. He was a part of the team that supported the development of TI-Nspire and TI-Innovator and continues to develop free resources for teachers and students.



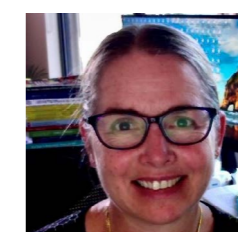
Allason McNamara teaches senior mathematics at Trinity Grammar School Kew in Melbourne. Previously she has been Head of Mathematics at Mount Scopus Memorial College and a number of other independent schools. She has a Masters Degree in Mathematical Modelling and Data Analysis, two Graduate Diplomas and a Degree in Agricultural Science from Melbourne University. She has been a co-author of several mathematics textbooks and VCE Specialist Mathematics examinations, and the Chief Assessor for VCE Mathematical Methods for the VCAA (Victorian Curriculum and Assessment Authority). She has been on a number of advisory committees for the VCAA and was part of the federal government's Expert Advisory Panel for the Year 1 Literacy and Numeracy testing. She is on the Board of the National Mathematics Summer School (NMSS) and the Australian Maths Trust (AMT) and is a Past President of the Australian Association of Maths Teachers (AAMT). Allason

is a Life Member and Past President and Treasurer of The Mathematical Association of Victoria and has done many presentations at the MAV conferences including keynote addresses. She is actively involved with MAV, writing the MAV trial exams, lecturing to VCE students and teachers and running state-wide Mathematics Games Days.



Thomas Moore is a passionate educator whose work has spread across many sectors of the Mathematics education domain. He has been a Leading Teacher (Head of Mathematics), DET tutor, and CRT at many schools across Melbourne,

and has worked with various Maths education learning and technology companies over the past 10 years. Thomas is currently completing his PhD, exploring how effective teachers of Mathematics develop productive pedagogical relationships with their students, and he enjoys sharing his ideas and resources with teachers through his Maths education consultancy work. Thomas is a regular presenter at MAVcon, he was the 2022 runner-up at the Australian Toastmasters Public Speaking Championship (Vic, Tas & SA), and he has keynoted various conferences over the past few years. Thomas is excited by the opportunity to delve into, explore and unpack how technology can best be used to enhance mathematical investigation and discovery.



Rachael Whitney-Smith is the Mathematics curriculum specialist at ACARA, responsible for Mathematics Curriculum F-12 and led the recent Australian Curriculum: Mathematics review and writing of AC: M version 9.0. She is also undertaking her PhD at

Notre Dame University in Mathematics Education. Rachael is passionate about applied mathematics, STEM and teaching mathematics through rich tasks that engage student thinking and reasoning, problem solving, modelling and investigation processes. Rachael has worked on National and International projects focussed on improving the mathematical outcomes of Australian students and has actively participated in the OECD Education 2030 project. Rachael is an active member on a number of mathematics advisory groups, member of ATSIMA, MERGA and NCTM, and led the work in revising the National Numeracy Learning Progressions as part of the National Online Formative Assessment Initiative. Rachael has been the Executive Officer, a Professional Learning consultant and is currently a board member for the Mathematical Association of Western Australia and on the board for the Australian Association of Mathematics teachers.



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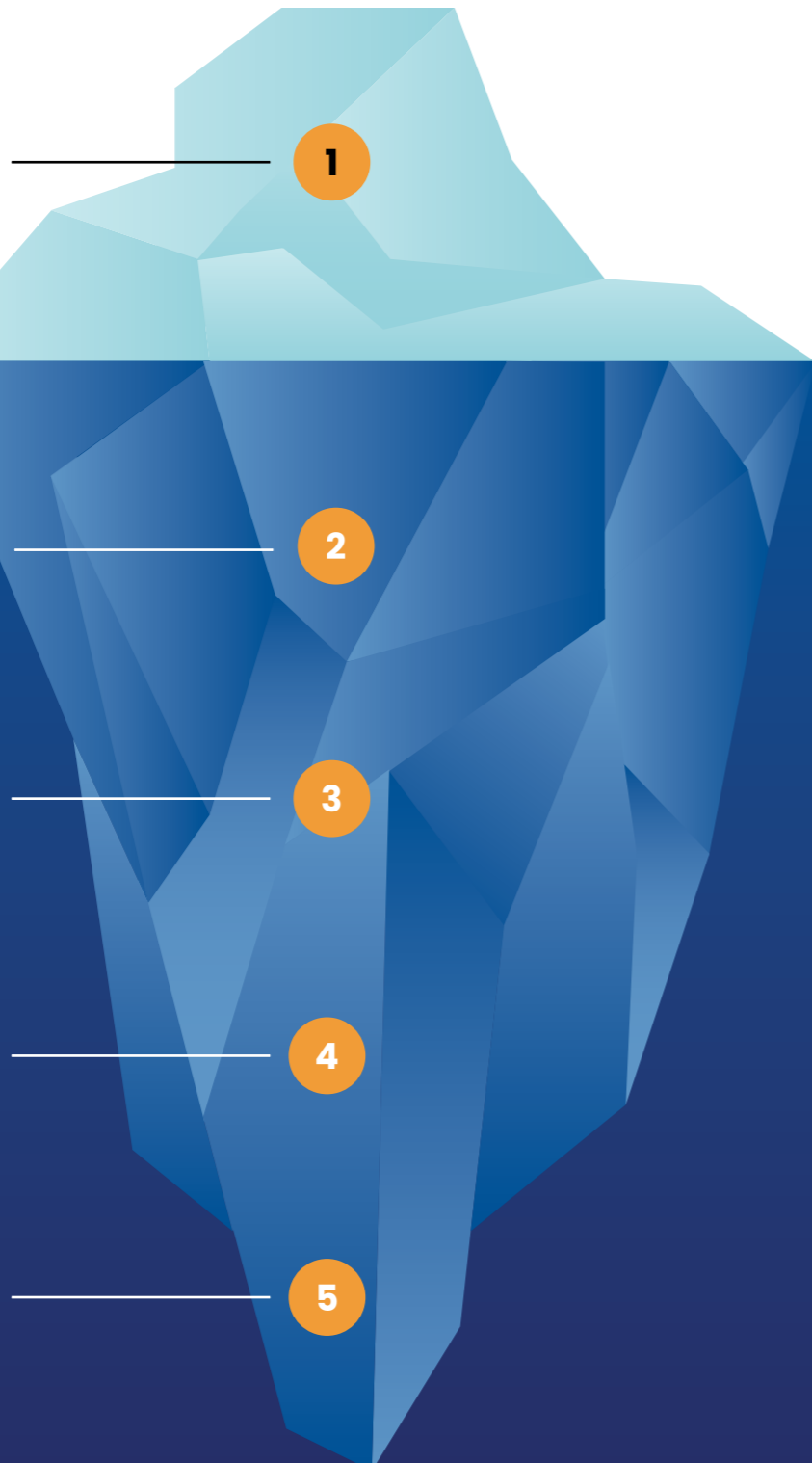
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MAV MEMBERSHIP



The Mathematical Association of Victoria (MAV) promotes the importance of mathematics to society. MAV has over 1400 members from all sectors of education including individuals, schools, universities. We provide membership benefits to a growing network of over 15,000 mathematics educators and reach over 60,000 educators, students and parents across metropolitan and regional Victoria via our 100+ events each year. MAV is the peak professional body for mathematics educators in Victoria.

We develop educator skills in implementation of evidence-based and cutting edge teaching and learning approaches. We work directly with students to increase their engagement in mathematics through games days, our Maths Talent Quest, Girls in STEM days, mathematics camps, VCE revision support, and other activities.

We are educational experts and leaders, supporting the future of mathematics education from early childhood to Year 12.

MAV works with teachers and school leaders to enhance student outcomes in mathematics and numeracy, better preparing students for their personal, professional and civic lives. Our role is to support educators in developing and delivering curriculum and programs that challenge our students to become the future of mathematical creativity and innovation.

To stay up-to-date, subscribe to the MATRIX e-newsletter at www.mav.vic.edu.au.



There is a member category for you:

- Individual member (teachers, academics, student teachers and those with an interest mathematics education)
- Institutional member (primary and secondary schools and early childhood centres)
- Associate member (industry partners or resource providers)

Visit the MAV website for more information, including member benefits, www.mav.vic.edu.au.

HOW I CAN I GET INVOLVED IN THE MAV?

MAV depends on its members for success. Extend your professional learning and get involved in MAV's activities:

- present at MAV's annual conference
- join one of our networks, or start your own with MAV support
- write for MAV journals
- join committees and working parties
- develop resources
- pilot mathematics initiatives
- develop a PD event at your school or venue
- judge the MTQ awards, or
- organise a maths games day for your region.

MATHS ACTIVE ACCREDITATION FOR YOUR SCHOOL

MAV's Mathematics Active Schools initiative is a way to recognise and support schools who demonstrate excellence in learning and teaching practices in mathematics.

- Publicise your schools Maths Active Schools certification and demonstrate to your school community that mathematics is enjoyable and highly valued.
- Receive regular activities and information from MAV to promote maths to your school community.
- Be invited to participate in special Maths Active School events.



SESSION DETAILS

THURSDAY 1 DECEMBER 2022

KEYNOTES: Thursday, 9.15am-10.15am

KT01 PEDAGOGIES TO AMBITIOUSLY ENGAGE EARLY YEARS STUDENTS

(Exploring effective pedagogies)

Janette Bobis, University of Sydney
(F to Year 2)

For many decades researchers have systematically explored the effectiveness of various pedagogies with the goal of improving teaching and learning. Emanating from this body of research we now know a great deal about practices for more effective teaching of mathematics. But mysteries surrounding why some practices seemingly work when implemented by one teacher or in one classroom but not for another still exist. My intention in this session is not to simply present a series of 'best' or 'effective' practices for teachers to memorise and imitate in their classrooms. Instead, I wish to raise awareness and spark discussion of what might be the potential of an ensemble of practices that can more ambitiously engage early years students in problem solving, and critical and creative mathematical thinking than is the current classroom norm.

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KT02 THE VALUE OF WORTHWHILE TASKS AS AN EFFECTIVE PEDAGOGY IN MATHEMATICS: ONLINE AND OFFLINE

(Exploring effective pedagogies)

Paul Swan, A-Z Type
(Year 3 to Year 6)

In this keynote Dr Paul Swan will share some tasks that employ many High Impact Teaching Strategies. Using some simple materials, such as counters and other materials commonly found around the home, Paul will ask participants to engage in some tasks that combine all of the proficiency strands: Understanding, Fluency, Problem Solving and Reasoning all vital elements of being prepared for a changing world. Along the way Paul will share some lessons learned from using some of these tasks in a remote learning environment.

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KT03 MATHEMATICS THROUGH AN ARTISTIC EYE

(Achieving greater equity, Improving individual and societal outcomes)

Shelley Hannigan, Deakin University
(Year 7 to Year 12)

This keynote presents and discusses examples that demonstrate the diversity of art and mathematics relationships relevant for secondary school teaching and learning. Examples will be shared in which art has been effective or useful for engaging students in learning STEAM subjects with an emphasis on mathematics. The design and structural synergies between mathematics and art, aesthetic qualities of the two subjects, and the interesting backgrounds of mathematics and art will be explored. Encouraging disciplinary based education as well as transdisciplinary education, effective ways of implementing art and maths together will be shared and discussed. This draws on my experience as a visual artist and my research exploring ways to use art to enhance STEAM teaching and learning.

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KEYNOTES: Thursday, 9.15am-10.15am (cont.)

KT04 NIMBLE NETWORKS

(Exploring effective pedagogies)

Hayley Dureau, Victoria Academy of Teaching and Leadership
(Year 7 to Year 10)

With more information and resources than ever before at our fingertips, is networking still relevant and should we bother investing time and energy into it? Hayley Dureau argues strongly yes! There's an invaluable degree of depth and insight that can be gained through dialogue, team-teaching, and observation, between mathematics educators. In this session, Hayley shares some of the opportunities and insights gained through the Teaching Excellence Program, including practical strategies for sharing and challenging thinking. The session explores examples of connections made between teachers in various contexts, settings, and sectors, and how the sharing of stories and strategies can open our minds to new ways of thinking and teaching and encourage the trailing of new ideas.

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KT05 COMPUTER PROGRAMMING IN THE MATHEMATICS CLASSROOM, GRADES 1-9: THE ONTARIO, CANADA, EXPERIENCE

(Technology to enhance investigation)

George Gadanidis, University of Western Ontario, Canada
(F to Year 10)

Computer programming has been integrated in the algebra strand for all grades 1-9 of the Ontario mathematics curriculum, affecting what mathematics is taught, how it is learned, and who can do it. I will share examples of teaching and learning mathematics with computer programming across the grades, with links to publicly-accessible resources, and with a focus on bringing to life mathematics concepts and relationships through dynamic modelling. The primary goal is to teach and value mathematics, with computer programming being a representational tool where appropriate.

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ONLINE SESSION: Thursday, 10.25am-10.55am

THESE SESSIONS ARE ONLINE ONLY AND WILL RUN DURING MORNING TEA.

OT01 USING THE PLACE VALUE ASSESSMENT TOOL (PVAT) TO GUIDE YOUR PLACE VALUE TEACHING IN 2023

(Valuing evidence)

Angela Rogers RMIT University
(Year 3 to Year 6)

Are you looking for a free comprehensive assessment to guide your teaching of place value in 2023? The Place Value Assessment Tool (PVAT) is a valid and reliable whole number place value paper and pen assessment for Year 3-6 students. Ange developed this assessment in her PhD research. In this session she will demonstrate how you can use the data your class or school gathers from the PVAT, to structure your planning and teaching of place value both in Term One and beyond. Ange will share ideas for moderating the data, and how creating and using a Guttman chart can assist you to analyse potential instructional gaps that may appear in your teaching of place value. You will walk away from this session with a clear understanding of how the PVAT can support your school to develop a whole school focus on place value through the use of the six aspects of place value.

OT02 ENGINEERING 'AHA' MOMENTS IN NUMBER

(Exploring effective pedagogies)

Doug Williams Mathematics Centre
(F to Year 6)

Calculating Changes has been engineering 'Aha' moments in number for more than 25 years. Evolving from classroom experiences shared through the network, it supports teachers to structure their classroom so 'Aha' moments happen more often. Children's number sense, concepts, skills, confidence and mathematical communication are enhanced and teachers are often surprised. If you teach K-6 this workshop is an opportunity to explore the teaching craft, classrooms, materials and activities around which Calculating Changes has developed. We will also touch on Working Mathematically with Infants, a resource that gathers the network's activities and pedagogy into 60 weeks of planned, sequenced number work through Years K-2.

OT03 CONCRETE, REPRESENTATIONAL AND ABSTRACT PEDAGOGY

(Exploring effective pedagogies)

Jonathan Carter Hume Central Secondary College
(Year 7 to Year 10)

Exploring effective pedagogies that engage students and equip them to be problem solvers, critical and creative users of mathematics. At Hume Central Secondary College, I am working through the action plan of developing the capacity of staff through teaching through the lens of Concrete, Representational and Abstract (CRA) pedagogy where we allow are students to effectively question why, and understand mathematical concepts on a deeper level.1. Integers - focusing on the visual aspect of hot and cold water to provide students the understanding that:

- 1 (hot water) plus -1 (cold water) cancels out.
2. Multiplication and division of fractions visually and using number lines.
3. Trig: exploration of the ratios involved with right angled triangles through application tasks prior to connecting with SOHCAHTOA.

OT04 INTEGRATING 'MATHTASK' IN MID-SENIOR LEVEL MATHEMATICS CLASSROOM: A POWERFUL PEDAGOGICAL TOOL TO PROMOTE STUDENTS' CONCEPTUAL UNDERSTANDING AND CONNECTION

(Exploring effective pedagogies)

Jiqing Sun Deakin University
(Year 10 to Year 12)

In many mid-senior level (i.e. Year 10 - 12) classroom, despite teachers understand underlining concepts and connection amongst these concepts are important, the practical teaching might be heavily 'procedure' orientated due to the pressure brought from tight curriculum timeframe and high-stake exams. In this sense, more pedagogical supports are needed so teachers are able to teach beyond 'procedures' in everyday practice. 'MathTask' provides a range of mathematical problems, and many of them are exam style questions, which can elicit deeper discussion around a particular topic. In this report, I will showcase how some of 'MathTask' problems can be utilised in everyday mid-senior level classrooms. My intention is to show how teachers can use this kind of problems as a pedagogical tool not also to cater for needs of the high-stake exam, but also enhance students' conceptual knowledge and its connection.

ONLINE SESSION: Thursday, 10.25am-10.55am

THESE SESSIONS ARE ONLINE ONLY AND WILL RUN DURING MORNING TEA

OT05 PROBLEM SOLVING: GETTING THEM ALL ABOARD

(Exploring effective pedagogies)

Mark Ljubic and Andrew Greville, St. Joseph's Secondary College Mildura
(Year 5 to Year 10)

Reflections from Mark....

I was in Year 7 in 1981. What a great year to start high school. My teacher Mr Greenwell wasn't your everyday sit down and do the left-hand side of the book teacher. Instead he threw down challenges that got us thinking about the process of tackling his at times off-beat questions. His questions, although open-ended, invited responses from all members of my mixed ability class as he sat in the front of the class and teased the answers from us. Today we hope to recreate those great moments as we look at 1981 more closely. Are you ready for the 1981 challenge?

OT06 FOOTY FEUD!: DEVELOPING NUMERACY THROUGH SPORT

(Technology to enhance investigation)

Andrew Williams, Footy Feud!

(Year 3 to Year 6)

Footy Feud! is an AFL licensed card game, developed by Andrew Williams - a former school and university maths/accounting tutor. In this session Andrew will detail how Footy Feud! has been used to great effect in primary schools across Victoria to enhance numeracy fluency of 1000s of students - especially six times tables, counting to 100 and strategic thinking skills. Andrew will also provide an overview of a specially designed 75min lesson plan featuring Footy Feud! which has been trialled with great success in Victorian schools during Terms 3 and 4.

OT07 WHAT IS 'BEST PRACTICE' IN 2022? WHAT IS GREAT TEACHING? WHAT ARE OUTSTANDING PEDAGOGIES?

(Exploring effective pedagogies, Valuing evidence)

Jennifer Bowden and Peter Saffin, The Mathematical Association of Victoria
(F to Year 6)

What is 'best practice' in 2022? Let's explore some aspects of great teaching and outstanding pedagogies to kick off

our day. We need our students to be able to do mathematics, and value it! They need to understand why it's important, as they require it for success in everyday life. Maths anxiety and disengagement can leave students feeling that maths is disconnected from their lived experience, and that mastery is required to feel success. Traditional approaches can create pass or fail situations (think üor X) that put students under stress and make students feel they can't succeed. Good teachers mix approaches; inquiry-based learning, warm-ups, number talks, discussion and exploring the proficiencies, supported by explicit instruction, prompts, differentiation and other techniques allow teachers to select the best approach for their students at their point of need, and in a typical mixed ability classroom not all students need the same instructional approach at the same time. Let's explore techniques educators can use, and how can you add to your repertoire.

OT08 WORTHWHILE CAS CALCULATOR USE IN THIS YEAR'S MATHEMATICAL METHODS EXAM 2

(Technology to enhance investigation)

Kevin McMenamin Mentone Grammar
(Year 9 to Year 12)

Routine and clever use of the CAS calculator in past Methods 2 examinations has shown it to be advantageous and worth the time and effort in getting to know it works. Generally, half of the multiple choice questions and many parts of the extended answer questions benefit from good calculator skills. This hands-on session will get you using the calculator to see just how helpful (or not) it was with this year's questions. The most efficient methods will be presented and questions where the calculator should be avoided will be pointed out. The session is suitable for TI-Nspire and ClassPad users and the Casio ClassPad will be the featured CAS.

OT09 MATHS THROUGH THE MATRIX OF POETRY

(Exploring effective pedagogies)

Tom Petsinis Deakin University
(Year 11 to Year 12)

I have presented my maths inspired literary work at a number of MAV conferences over the years. For the forthcoming conference I will present a reading of various mathematical poems from my new book to be published next year titled Mag(π) Poems. The reading will engage participants and stimulate discussions about maths in all its facets - its

history, protagonists, philosophy, practice and teaching. The presentation will endeavour to encourage teachers to use poetry, and literature in general, as matrix that broadens the teaching context and raises student awareness of the cultural underpinnings of the subject.

OT10 USING THE IPAD AND APPLE PENCIL TO ENHANCE YOUR TEACHING

(Technology to enhance investigation)

Alistair Shaw, Victory Christian College
(Year 7 to Year 12)

Remote learning has encouraged many of us to rethink the way we teach our classes. MyNotebook is a free iOS app that is designed to help streamline the transition between the traditional whiteboard board and a digital platform. Through the use of an iPad and an Apple Pencil, you can write on existing documents, handwrite new notes and draw diagrams. MyNotebook has a number of built in maths objects including maths shapes and a dynamic cartesian plane. I would like to share how I have used this app as a primary teaching tool in my classroom.

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SESSION A: Thursday, 11am-11.50am

A01 DEVELOPING A THINKING CLASSROOM: TEACHING AND LEARNING INSIGHTS

(Exploring effective pedagogies, Valuing Evidence)

Angela Rogers, RMIT University and Bernadette Long, Glowrey Catholic Primary School (F to Year 6)

This time last year, Peter Liljedahl presented an outstanding keynote presentation at the MAV conference. His research and work around “Building Thinking Classrooms in Mathematics” was inspiring. After watching Peter and reading his book, Ange and Bern began a quest to see how this approach could work in a school setting. This session presents the insights and learnings we gained through trialling some of Peter’s 14 practices in several primary classrooms. Insights from teachers and students will be shared, as well as the practical constraints and obstacles we faced implementing this ‘new’ approach. Whether you are familiar with Peter’s research or not, this session will provide practical ideas on how to easily and effectively begin the journey to turn your classrooms into places where students are given the opportunity to truly think deeply in mathematics.

A02 HOW IS CRITICAL THINKING VALUED IN MATHEMATICS?

(Exploring effective pedagogies)

Stacey Lamb, St. Bernard’s Primary School Wangaratta (F to Year 6)

Problem solving and critical and creative thinking are skills for life. Learning and teaching beliefs, classroom environment and the choice of Mathematical tasks are paramount. Through the use of Maths Talks, games and Challenging Maths Tasks learn how students have become problem solvers, critical and creative thinkers in a primary setting. This hands on workshop will offer tasks and games, look at students work samples and videos, as well as provide ideas and protocols for setting up classrooms that honour agency, problem solving and critical and creative thinkers.

A03 FURTHER MATHS EXAMS: USING THE CAS CALCULATOR EFFICIENTLY AND EFFECTIVELY

(Technology to enhance investigation)

Kevin McMenamin, Mentone Grammar (Year 9 to Year 12)

This session will look at questions from last year’s Further Maths papers and discuss how useful the CAS calculator was in determining their answers. This would be particularly useful to teachers who are new to the subject and teaching for the first time. The session offers a hands-on experience that will give you the opportunity to use the calculator just like the students on all the questions where it would be most beneficial. The session is open to Ti-Nspire and ClassPad users and the featured calculator will be the Casio ClassPad.

A04 DETAILED ANALYSIS OF CAS CALCULATOR USAGES IN 2022 VCE SPECIALIST MATHS EXAM 2

(Technology to enhance investigation, Exploring effective pedagogies)

Peideng (Martin) Nie, Austin Education Pty Ltd (Year 11 to Year 12)

The detailed uses of both TI Nspire and Casio CP400 CAS calculators will be discussed within the 2022 VCAA Specialist Maths Exam 2, and the featuring calculator will be TI Nspire. Similar and different features on common questions will be compared. Within the timeframe, some relevant CAS functionalities regarding the 2023 VCE Specialist maths study design will also be discussed and useful combined operations will be investigated, including vector cross product, calculating volumes, equations of lines and planes, etc. Other relevant VCAA exam questions will be referenced with appropriate adjustment in conjunction with these CAS calculator applications. A Number of CAS widgets created for vectors, Kinematics and differential equations will also be shared with the attendees. The detailed CAS usages for recent VCAA SM2 exams will be shared with all attendees.

The attendees, at the end of the presentation, will receive a PDF containing the detailed CAS uses for the 2022 Specialist Maths exam 2.

A05 ALLEVIATING ANXIETY

(Improving individual and societal outcomes, Exploring effective pedagogies, Valuing evidence)

Dietmar Schaffner, Penleigh and Essendon Grammar and Matthew Schaffner, Mac Robertson Girls’ High School (Year 9 to Year 12)

This workshop explores the phenomenon of performance anxiety in mathematics. Using research literature and selected case studies of students in our respective senior schools, we try to determine the causes of performance anxiety, the effect that this has on student performance in assessment tasks and possible strategies for its amelioration. Although we describe our own experiences in dealing with test anxiety, we also hope to generate discussion amongst delegates with a view to promoting further research.

A06 USING CARDS AND COUNTERS TO LINK THE PROFICIENCIES

(Exploring effective pedagogies)

David Dunstan, Association of Independent Schools of WA and Paul Swan, A-Z Type (F to Year 6)

In this presentation simple materials such as cards and counters will be used to illustrate how the four proficiency strand: understanding, fluency, problem solving and reasoning may be linked with content from the number strands. Participants will be involved in using these materials to explore the key facets of the proficiency strands. Participants will be provided with support materials to help them try these ideas in the classroom.

A07 ASSESSING STUDENTS: ONE SIZE DOES NOT FIT ALL!

(Achieving greater equity, Exploring effective pedagogies, Valuing evidence)

Catherine Pearn, Carmel Mesiti and Kate Copping University of Melbourne (F to Year 8)

This workshop focuses on adapting assessment tasks to differentiate for student learning needs and assessment purposes. You will be invited to analyse sample tasks and rewrite these in different formats, for different purposes, depending on students’ needs. We will explore the modification of tasks to support learners who are both successful and unsuccessful with the original task to determine the extent of their mathematical skills, knowledge

and understanding. This workshop will suit teachers who would like to be supported in writing good questions or creating and planning assessment tasks.

A08 MATHS GAMES TO ENGAGE STUDENTS

(Improving individual and societal outcomes)

Helen Haralambous, Mathematical Association of Victoria (Year 7 to Year 10)

After two years of working virtually come and experience playing some Maths games with you colleagues again. Maths games are also a useful tool in engaging all students. MAV Games Days are very popular and a great way of engaging students through competing with like-minded individuals. In this hands on workshop participants will trial a selection of games and activities, that will both engage students in the classroom, whilst also providing ideas for schools wishing to run smaller scale Games Days at a local level.

A09 PLANNING FOR MEANINGFUL FORMATIVE ASSESSMENT STRATEGIES - INFORMING TEACHING AND LEARNING WHILST PRIORITISING WELL-BEING

(Exploring effective pedagogies, Valuing evidence)

Emma Moore, Cowes Primary School (Year 3 to Year 6)

How can we maximise opportunities to collect data that focus on capturing a moment when the students are relaxed, engaged and aware of what they need to know?

In this session we will use the curriculum, learning progressions and a lesson structure that allocates time specifically for formative assessment. We will explore strategies that target specific data collection whilst empowering the students to identify what they know and what they can learn next. Techniques highlighted will focus on the planning for opportunities and feeding back to the students in ways that remove the stress of grades or levels but allow teachers to fulfil their reporting requirements. Students and teachers will feel confident in the knowledge that the skills required for the effective application of mathematics in life for the future are acquired in ways that emphasise the importance of the effects of well-being on achievement.

SESSION A: Thursday, 11am-11.50am (cont.)

A10 FLIP OUT: HOW A FLIPPED CLASSROOM TRANSFORMED MATHEMATICS LEARNING OUTCOMES IN A SMALL RURAL TOWN

(Achieving greater equity, Improving individual and societal outcomes, Exploring effective pedagogies, Valuing evidence)

Andrea O'Connor, Catholic Education Sandhurst and
Andrea Skahill, Marian College
(Year 5 to Year 12)

The presenters will share how the use of flipped classroom pedagogy was implemented to transform student mathematical learning achievement in a small outer regional secondary school. The flipped classroom moved teacher-centred instruction out of the classroom to provide more time in the classroom for visible student-centred learning. The student voice is loud and clear, the instructional videos created by Ms Skahill have boosted students' mathematical confidence and supported their learning. Greater emphasis on students' to take ownership of their learning has resulted in increased student agency and efficacy. The classroom is effectively differentiated to ensure all learners are working within their Zone of Proximal Development.

Mini-lessons provide explicit instruction at the point of need, while other students work collaboratively on engaging learning tasks, re-watching videos and sharing problem-solving strategies. The flipped classroom and effective differentiation of lessons has ensured all learners are provided access to the curriculum, and developed a learning culture where students are encouraged to problem solve and apply knowledge in engaging maths investigations.



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SESSION B: Thursday, 12pm-12.50pm

B01 PROBLEM SOLVING - MORE THAN JUST SOLVING PROBLEMS

(Exploring effective pedagogies)

Paul Staniscia, Southern Cross Grammar
(F to Year 8)

To become proficient in mathematics, students need to spend time doing mathematics (solving problems, justifying their thinking, developing understanding, practicing skills) and building connections between their previous knowledge and new knowledge. The National Research Council (2001) views Mathematical Proficiency as something that is developed through five interdependent and interwoven strands - Conceptual Understanding, Procedural Fluency, Strategic Competence (Problem Solving), Adaptive Reasoning and Productive Disposition. Therefore, Problem Solving is one piece of a much larger puzzle and is much more than just providing students with a problem solving task to complete. Using the Mathematical Proficiency Strands, this workshop will explore a Problem Solving instructional model to teach and assess mathematical proficiency through whole school moderation practices and self, peer and teacher feedback..

B02 DEVELOPING A WHOLE SCHOOL APPROACH AND SCHOOL VISION ABOUT THE TEACHING OF MATHEMATICS

(Exploring effective pedagogies, Valuing evidence)

Jessica Kurzman, St. Patrick's, Kilmore
(F to Year 6)

Challenging tasks, implemented using mixed ability settings, can be an effective mode to enhance and promote student discussions which leads to reasoning and deeper understanding of mathematics concepts. The Launch Explore Summarise instructional model can support teachers to confidently set up class structures that facilitate and guide this type of learning. To develop cohesion in teaching practices across the school, all staff should be provided with opportunities to deepen their understanding of up to date research informed strategies, through school-based professional learning. Critically, this professional learning should enable teachers to be involved in the decision making and direction, rather than simply be directed by leadership. The focus of this seminar is to share a sequence of steps used to develop a whole school approach and school vision about the teaching of Mathematics. A particular focus will be on the need to influence teacher perspectives and mindsets to support the use of challenging tasks and mixed

ability settings. I will share the process used from my own setting over the past 12 months to ensure there is a deeper understanding of best practice methodology for teaching mathematics, including the success and challenges that occurred along the way.

B03 DO YOU WONDER WHAT EXPLICIT TEACHING IS IN THE MIDDLE YEARS?

(Exploring effective pedagogies, Valuing Evidence)

Sharyn Livy, Monash University, Allan Dougan, Australian Association of Mathematics Teachers and Helen Chick,
University of Tasmania
(Year 3 to Year 8)

The focus of this workshop is to demonstrate and discuss explicit teaching through the example of equivalent fractions. We have been working together as a team this year to discuss the most effective approaches to using explicit teaching pedagogy. During this presentation, we will share our understanding of seven essential components of explicit teaching that consider student learning needs, which supports them to make connections when problem-solving and reasoning. A goal of this approach is to provide teachers with tools for teaching students to become confident and competent learners while working on engaging problems.

B04 PROOF: A NEW TOPIC IN SPECIALIST MATHS

(Exploring effective pedagogies)

Katherine Seaton, La Trobe University
(Year 11 to Year 12)

Previously students in Specialist Maths have been asked to "show that" something holds. In the new study design, this is formalized and expanded to proof by a variety of methods, with the underlying expectation of being logical and using symbols such as quantifiers and implication (\Rightarrow) accurately. This session will consider proof by contradiction and by induction, the use of cases in some proofs, and when proving the contrapositive statement is the best approach. Although proof is listed in a particular Topic and Area of Study, the Outcomes makes it clear that students can be asked to prove concepts from any of the Areas of Study, so examples will be drawn from across the various Areas.

B05 USING NAPLAN QUESTIONS TO HELP INFORM YOUR TEACHING

(Exploring effective pedagogies, Valuing evidence)

Nadia Abdelal, EM Maths Consulting
(Year 3 to Year 10)

NAPLAN is made up of some great questions that can be used in many ways to help inform our teaching and to develop our students' ability to successfully solve problems. In this workshop, I will talk about how using NAPLAN questions as warm-ups have helped teachers to understand their students better. Along with problem-solving, we will talk about how these types of questions can be useful as formative assessments as well as make student misconceptions about a topic more apparent.

B06 ENHANCING STUDENT ENGAGEMENT THROUGH CREATIVE PROBLEM SOLVING, A COMMUNITY OF PRACTICE

(Achieving greater equity, Improving individual and societal outcomes, Exploring effective pedagogies, Valuing evidence)

Jennifer Bowden, Mathematical Association of Victoria and Megan Teefey, Victorian Department of Education
(F to Year 8)

As a CoP we used student surveys and networkwide data to create a Theory of Practice; If we have improvement of practice in 'Creative Problem Solving' then our students will demonstrate increased engagement as math learners. Over 2022 the CoP has worked together to use evidenced based resources to improve the teaching and learning of creative and critical thinking and problem solving across our schools. This is through effective planning, quality resources, emerging technology and engaging tasks. Working together, sharing resources and practice with the support of MAV Consultants we have improved the outcomes for students, teachers and leaders. Location and isolation could mean that Alpine - Towong Network schools have challenges improving social outcomes and equity for students, we would love to share how we have overcome this to achieve success.

B07 FIRST 10 DAYS OF MATHS: ESTABLISHING A CONSISTENT LEARNING CULTURE ACROSS YOUR SCHOOL

(Achieving greater equity, Exploring effective pedagogies)

Chris Terlich and Steve Lester, Leongatha Primary School
(F to Year 6)

Does your school have some great mathematical practices happening in isolation? Is your school looking at establishing a consistent approach to teaching and learning to ensure all students have the opportunity to be successful while building teacher confidence? This workshop will share the case study of a school that has used the 'First 10 Day of Maths' to help shift their teaching and learning culture. Some concepts that will be shared include the mathematical proficiencies, effective learning partners, Number Talks, using manipulatives, open-ended learning tasks and a consistent instructional model.

B08 MATHEMATICAL METHODS EXAM 2-2022 SOLUTIONS ON CAS (TI NSPIRE)

(Exploring effective pedagogies, technology to enhance investigation)

Sanjeev Meston, Firbank Grammar
(Year 11 to Year 12)

This session will demonstrate the efficient and effective use of CAS technology to respond to Multiple choice and Extended response questions of the VCAA 2022 Methods examination. Although, this session will use the TI Nspire CX-CAS technology, the same process with slight variations can be used with other CAS technologies permitted by VCAA. The session will suit current or teachers intending to teach the Methods course in 2023.

SESSION B: Thursday, 12pm-12.50pm (cont.)

B09 NEW TEACHER SERIES, PART 1: EFFECTIVE AND POWERFUL PEDAGOGICAL APPROACHES. THRIVE IN YOUR FIRST 5 YEARS OF TEACHING!

(Improving individual and societal outcomes)

Danijela Draskovic, Mathematical Association of Victoria (Year 7 to Year 12)

Important: This is part 1 of a special 2-part series aimed to assist new teachers in navigating their first five years in the classroom. You do not have to register for Part 1 and 2, however, to get the most out of the series, Part 1 and 2 should be attended on the day. It has been well publicised that a significant percentage (up to 50%) of graduate teachers leave the profession before they have reached the milestone of five years of teaching. With the balance of classroom management and establishing relationships with key stakeholders, managing workload, and ensuring your curriculum planning caters to varying abilities and linked to assessment data, there is no doubt graduate teachers can feel overwhelmed. In this first part of the 2-part series, we will share and unpack engaging warmups/games, and look at the powerful pedagogical approach of starting with a problem students want to solve. We will discuss how to effectively weave all four proficiencies (understanding, fluency, problem solving and reasoning) into our practice. The work of Professor Peter Sullivan is the main inspiration for this session.

B10 NEVER MIND THE PARABOLICS. HERE'S THE QUADRATICS

(Exploring effective pedagogies)

Stephen Hanlon, Braemar College (Year 9 to Year 10)

This workshop draws on some themes of a Year 9&10 elective subject that I teach each semester at Braemar College called Maths, Magic & More. You will learn a couple of playing card tricks that rely on the binary number system, see how solving equations in different bases use quadratic equations, watch how a parabola was used to make a popular music video and why satellite dishes are parabolic using a little "origami". Hopefully you will take away some ideas and activities that can be used in the classroom to either introduce the topic, demonstrate why the parabola is so important or just spice up a lesson.

SESSION C: Thursday, 1.30pm-2.20pm

C01 DO YOU WONDER WHAT EXPLICIT TEACHING IS IN A PRIMARY MATHEMATICS CLASSROOM?

(Exploring effective pedagogies, Valuing evidence)

Sharyn Livy, Monash University, Allan Dougan, Australian Association of Mathematics Teachers and Helen Chick, University of Tasmania (F to Year 6)

The focus of this workshop is to demonstrate and discuss explicit teaching by focusing on intuitive strategies. We have been working together as a team this year to discuss the most effective approaches to using explicit teaching pedagogy. During this presentation, we will share our understanding of seven essential components of explicit teaching that consider student learning needs, which supports them to make connections when problem-solving and reasoning. A goal of this approach is to provide teachers with tools for teaching students to become confident and competent learners while working on engaging problems.

C02 USING MATHS TALKS TO BUILD NUMBER SENSE AND TRANSFORM THE MATHS LEARNING EXPERIENCE

(Exploring effective pedagogies)

Alex Box, Education Specialist (F to Year 8)

Maths talks are 5-15 minute purposefully crafted collaborative conversations that create authentic opportunities for mathematical thinking. This session is an introductory focus on maths talks - what they are, why they are important and how they can help to transform the maths learning experience for students, and the teaching experience of teachers! This session will explore three different kinds of maths talk, clarify their purpose and provide resources and ideas for classroom implementation. The pedagogical ideas will be appropriate for teachers who want to foster mathematical proficiency and help bust commonly-held and damaging myths about maths.

C03 FOUNDATION MATHEMATICS UNITS 3 AND 4 - INTERESTING DATA GRAPHS

(Improving individual and societal outcomes)

David Leigh-Lancaster, Leigh Lancaster Consulting (Year 11 to Year 12)

The new Foundation Mathematics Units 3 and 4, for implementation from 2023, includes the study and application of a broader range of interesting data representations commonly used in business and industry, such as bubble, Mekko, radar, sunburst, heat map and stacked area charts. This session provides a practical introduction to these representations and their applications, and shares some related resources.

C04 PROBLEMS WORTH CODING - PSEUDO CODE & ALGORITHMIC THINKING

(Exploring effective pedagogies, Technology to enhance investigation)

Peter Fox, Texas Instruments (Year 7 to Year 12)

What is pseudo code and algorithmic thinking? The first session of "Problems Worth Coding" was held at the MAV 2016 annual conference. Three additional sessions containing a range of different problems have been covered since. With pseudo code and algorithmic thinking now forming part of the senior mathematics curriculum, it's time to take a reflective journey and revisit some of the great problems that have been covered (plus a few new ones), with a flavour of pseudo code and corresponding algorithms. The problems covered in this session have a strong mathematical flavour.

C05 HOW WE TAUGHT YEAR 7 MATHS AT SANDRINGHAM COLLEGE IN 2022

(Achieving greater equity, Improving individual and societal outcomes, Exploring effective pedagogies)

Wendy Taylor, Sandringham College (Year 7 to Year 8)

This year at Sandringham College we introduced a fully differentiated curriculum. Our goals were to ensure all students had the opportunity to feel success and be appropriately challenged. To support students' learning of the specific skills within our program we created our own textbook, online instructional videos for all skills and homework sheets that continue to review previously taught

SESSION C: Thursday, 1.30pm-2.20pm (cont.)

skills to increase retention. This presentation will unpack the creation and implementation; how we decided on our curriculum, how resources were created, what worked well and what we will be refining for next year. We happily share our resources via the website mathsquad.org/sc-7.

C06 LAUNCH, EXPLORE & SUMMARISE- TIPS FOR IMPLEMENTING A NEW INSTRUCTIONAL MODEL

(Achieving greater equity, Exploring effective pedagogies)

Michael Minas, Love Maths
(F to Year 8)

In this workshop, we examine the Launch-Explore-Summarise instructional model. What are the key features of this approach to structuring a maths lesson and how does it differ from other, more traditional lesson structures? Attendees will participate in a modelled lesson, allowing them to gain a deeper understanding of the benefits of using this approach. We will also discuss issues such as student agency, differentiation, teacher questioning and perhaps most importantly- student engagement. Each participant will leave with a clear understanding of how to lead the implementation of the Launch-Explore-Summarise instructional model at your own school.

C07 LEARNING SEQUENCES TO SUPPORT AND INSPIRE TEACHERS F TO Y4

(Exploring effective pedagogies)

Dianne Liddell, Engage Empower Educate
(F to Year 4)

This session aims to outline a collaborative project between the Department of Education and a team of MAV consultants in researching, drafting and creating a folio of Learning Sequences, targeted at Foundation to Level 4. The brief of this project was to support teachers in delivering high-quality lessons that are relevant, contemporary, and targeted to students' varied needs. Each Sequence consists of rich and engaging teaching and learning activities that address specific aspects of the Victorian Curriculum: Mathematics. By providing insight into the development of Learning Sequences, this session aims to support and inspire teachers to design learning experiences that promote greater conceptual development, by exploring the curriculum through an interconnected web of mathematical big ideas and concepts.

C08 META-COGNITION SKILLS: SUPPORTING SENIOR MATHEMATICS STUDENTS

(Exploring effective pedagogies)

Rohani Mohamad, Minaret College
(Year 11 to Year 12)

This presentation focuses on meta-cognition skills as defined in one of the areas within the "Critical and Creative Thinking" capabilities. These skills would enable students to understand, manage, and reflect on their thinking and learning processes. At senior mathematics level, we explored how our students have been trained to develop and/or enhance their meta-cognitive skills over the years 2021-2022, during and after Covid pandemic years. The adapted strategies to support students learning such as questioning, explicit teaching, and modelling of thinking throughout this journey are captured. Students' perspectives and reflections on the effectiveness of these strategies, virtually and physically, were gathered. The involved teacher and selected students will share their findings at the presentation.

C09 NEW TEACHERS SERIES PART 2: EFFECTIVE USE OF ICT. OUR FAVOURITE DIGITAL TOOLS. [THRIVE IN YOUR FIRST 5 YEARS OF TEACHING!]

(Technology to enhance investigation)

Danijela Draskovic, Mathematical Association of Victoria
(Year 7 to Year 12)

Important: This is part 2 of a special 2 part series aimed to assist new teachers in navigating their first five years in the classroom. If you missed Part 1, don't worry as you will be able to watch it at a later stage. It has been well publicised that a significant percentage (up to 50%) of graduate teachers leave the profession before they have reached the milestone of five years of teaching. With the balance of classroom management and establishing relationships with key stakeholders, managing workload, and ensuring your curriculum planning caters to varying abilities and linked to assessment data, there is no doubt graduate teachers can feel overwhelmed. This 2nd part will showcase a selection of digital technologies I have deemed to be very useful and user friendly. These will include freely available software and maths apps which you can easily and readily use in your classrooms. We can leverage technology to help students visualise concepts, collect, model and analyse data, and help students stay connected to a safe community of learners. Technology can be one of your greatest teaching tools. No doubt since we

have done quite a bit of remote-teaching and learning as of late, we have all been forced into considering the way we use our ICT. This session will provide opportunities to share those experiences, and share your personal favourites.

C10 THESE HANDS-ON TASKS HAVE WORKED FOR ME

(Exploring effective pedagogies)

John West, Mathematical Association of Western Australia (MAWA)
(Year 5 to Year 10)

In this workshop we will explore some of the best hands-on ideas I've collected over the past 20 years for engaging students with particular aspects of the mathematics curriculum. Many of these ideas have been inspired by Sullivan's Launch-Explore-Summarise approach and the work of Doug Clarke and Charles Lovitt. I'm a big fan of number puzzles and problem solving and hopefully will be able to share with you some ideas that have worked for me in my work with students, teachers and in the WA Mathematics Problem Solving Program that MAWA runs in partnership with the Australian Maths Trust.

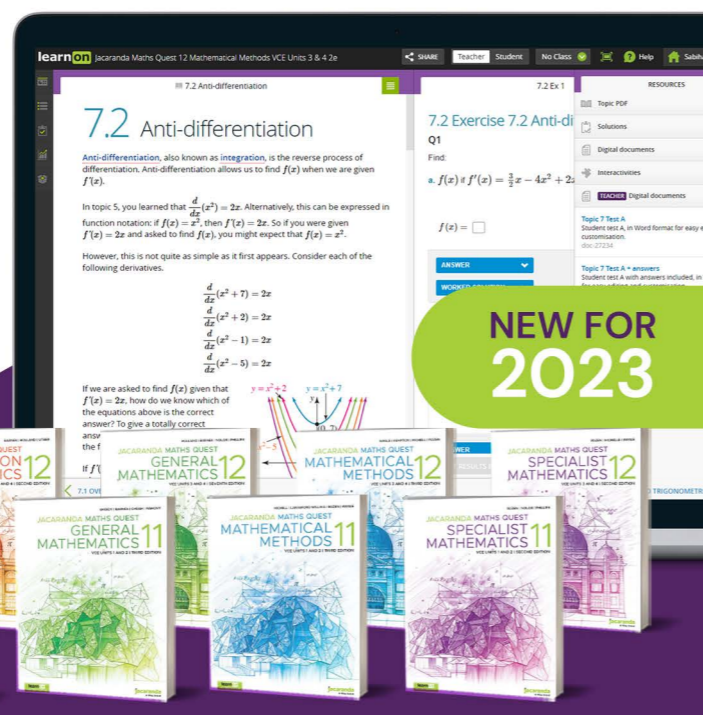
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SESSION D: Thursday, 2.30pm-3.20pm

D01 EVIDENCE-BASED MULTIPLICATION IN THE CLASSROOM

(Improving individual and societal outcomes)

Michael Nelson, Drysdale Primary School
(Year 3 to Year 8)

Multiplication and multiplicativity thinking remains the most important factor in the development of students mathematical knowledge and is responsible for the gap in understanding within classrooms. This presentation goes beyond just the theory and focuses on how teachers can deliver an evidence-based multiplication in their classrooms, including rich and engaging tasks, assessment tasks and how to build materials and manipulatives into normal lessons.

D02 UNPACKING THE MATHEMATICAL PROCESSES IN THE NEW AUSTRALIAN CURRICULUM: MATHEMATICS (PRIMARY)

(Technology to enhance investigation, Improving individual and societal outcomes)

Rachael Whitney-Smith, Australian Curriculum Assessment and Reporting Authority (ACARA)
(F to Year 6)

This workshop is aimed at unpacking the mathematical processes in the new Australian Curriculum: Mathematics version 9.0. The problem-solving and investigation processes of Mathematical modelling, Computational thinking, Statistical investigation and Probability experiments and simulations are now explicitly included as essential learning in content descriptions and achievement standards in the revised Australian Curriculum: Mathematics and references to the use of digital tools are made throughout the curriculum document. Workshop participants will be provided with some of the background information for their inclusion, examples of how the mathematical processes can be developed in practice, links to existing resources and an opportunity for discussion about what impact this new content will have on curriculum planning, classroom pedagogy and assessment in Primary.

D03 INFINITE THINGIES

(Technology to enhance investigation)

Anthony Harradine, Potts Baker Institute, Prince Alfred College
(Year 7 to Year 10)

How can a simple scientific calculator help to fuel a lovely investigation that leads to students making sense of recurring decimals and various other infinite thingies. As well as a lot of fun, the investigation is dripping with delicious mathematics. You will enjoy the experience.

D04 FREE INNOVATIVE FINANCIAL LITERACY RESOURCES FROM FBF

(Improving individual and societal outcomes)

Damian Nicholson, Financial Basics Foundation
(Year 7 to Year 12)

Financial Basics Foundation (FBF) provides free of charge to all Australian secondary teachers extensive resources and services designed to support students to develop financial life skills.

In 2021/2022, FBF and Griffith University undertook a research piece on the financial literacy of Young Australians. This workshop will focus on the practical application of this research, including the practical application of financial literacy as a learning context in the mathematics curriculum.

The session will further explore FBF's mathematics focussed financial literacy WebQuests, developed to help teachers dealing with COVID-19 disruption, and ESSI Money, an interactive online game delivered in an innovative app-based environment. When playing ESSI Money, students practice a wide range of real-life earning, saving, spending and investing and experience the financial consequences in a safe, fun and challenging way.

Freely downloadable Blackline Masters style 'offline' classroom resources for financial literacy education will also be showcased.

All FBF resources are mapped to the Australian Curriculum and provided free of charge to Australian educators.

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We invite you to come to the **ABACUS CALCULATORS** stand to receive your **FREE Abacus Pens**. We would love to meet you!

THANK YOU! 😊

SESSION D: Thursday, 2.30pm-3.20pm (cont.)

D05 HOW DO YOU PREPARE LEARNERS FOR REAL-WORLD PROBLEM SOLVING IN A COMPUTATIONAL AGE?

(Exploring effective pedagogies, Technology to enhance investigation)

Kelly Lean and Alec Titterton, Wolfram Research (Year 5 to Year 12)

For 10 years, Wolfram Research has been developing a methodology framework and delivery platform for training learners at all stages in computational thinking skills. This presentation will outline the framework for building a computer-based curriculum; taking modern, relevant, problems and using them in a blend of experiential and constructivist learning to enable learners to gain crucial skills that are lacking from current mainstream curricula around the world. Using a range of examples from Primary to High school, the delivery platform for the learning will be demonstrated, showing how teacher-learner interactions are supported and how learners can be creative within the materials allowing them to explore their own directions and methods of investigation.

D06 A FEW OF OUR FAVOURITES; MATHEMATICAL TASKS AND TIPS!

(Achieving greater equity, Exploring effective pedagogies)

Jennifer Bowden, Mathematical Association of Victoria and Ellen Corovic, Corovic Consulting (F to Year 6)

They're back! Join Ellen and Jen as they reunite to share with you a few of their favourites. In this session the presenters will take you on a journey to explore a selection of their favourite mathematics tasks and tips. Harnessing their many years as education consultants and drawing upon evidence-based practices this session will focus on effective mathematics pedagogies and collaboration. Join us for an engaging workshop and some favourites.

D07 MATHEMATICS FOR SOCIAL JUSTICE

(Achieving greater equity, Improving individual and societal outcomes)

Jenna Dore, St Francis Xavier College (Year 5 to Year 10)

How many times have you heard the following from your students? When will I ever use this? I don't need maths. I'm not a maths person. My mum and dad couldn't do maths either. Traditional methods of teaching mathematics - teacher-centered and rote-learning based - favour particular social demographics. Higher level mathematics education and math-intensive fields lack cultural diversity and are under-represented by females and individuals from low socioeconomic backgrounds. Adults with high numeracy proficiency are more likely to be employed and have a higher income than their low proficiency counterparts. In short, traditional maths education continues the cycle of social injustice. Social justice mathematics presents students with real life and relevant data which relates to the very issues that lead to such inequality in the first place. Students are given the opportunity to see themselves in math education and understand the relevancy maths has in their lives. This presentation will: - Help you identify maths which inhibits inclusive education - Provide you with practical examples of social justice mathematics you can use in the classroom - Demonstrate where Social Justice Mathematics fits into the Australian Curriculum - Showcase successful examples of Social Justice Mathematics in action.

D08 EQUIVALENT FRACTIONS: FROM CUISENAIRE RODS TO CALCULUS

(Achieving greater equity, Improving individual and societal outcomes, Exploring effective pedagogies)

Stephen Paatsch, University High School (Year 7 to Year 10)

Equivalent Fractions are introduced to students in Victoria at Level 4 in the current Victorian Curriculum (Mathematics). Equivalent Fractions are then referred to in Level 6 (fractions with related denominators) and Level 7 (comparing fractions using equivalence). Often, this topic is treated as a simple exercise to be completed before moving students on to further fraction work. However, I believe that Equivalent Fractions are relevant to so much of the secondary mathematics course and that they should be explicitly

referred to throughout our students' work. My presentation will emphasise the importance and use of Equivalent Fractions in numerous topics from Year 7 all the way through to the highest level of VCE Mathematics. Multiple examples will be provided at all levels and teachers will be provided with concrete examples that can be incorporated both implicitly and explicitly from Year 7 onwards. Year 7-10 Maths teachers (in particular those teachers not trained to VCE level)

D09 CALCULATORS: HOW DO THEY DO THAT?

(Technology to enhance investigation)

Daniel Milutinovic, Independent (F to Year 10)

Explore some of the algorithms underpinning calculators, including arbitrary precision arithmetic and programming. Also consider computer-aided assessment and how this can be used to improve numeracy skills in younger students as well as knowledge of other areas of mathematics for older kids. PLEASE NOTE: This is not on any commercially available calculator, rather on a custom calculator that can be built from readily available parts.

D10 DIAGNOSE STUDENT UNDERSTANDING WITH THE EFFECTIVENESS OF A RESEARCHER AND THE EFFICIENCY OF A MACHINE

(Valuing evidence)

Lindy Sharkey and Julian Lumb, Pearson (Year 5 to Year 10)

In this presentation we will demonstrate how simple it is to accurately diagnose a student's level of understanding using Pearson Diagnostic. The Pearson Diagnostic quizzes use sophisticated algorithms to determine each learner's initial level of understanding. Based on their results, each student is assigned personalised targeted activities with a focus on critical thinking and concept development. The innovative quizzes were developed using over 30 years' worth of Australian and International academic research by the University of Melbourne. The quizzes were developed with the vision to improve mathematics teaching through better pedagogical content knowledge and the broader and more effective use of formative assessment. This is a commercial presentation.

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MAV TRIAL EXAMS

2022 | ALL STUDIES

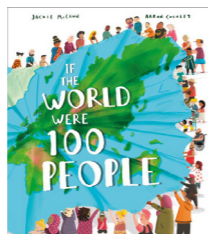
MAV 2022 TRIAL EXAMS

VCE

Prepare effectively for VCE mathematics examinations with the MAV Trial Exams for Mathematical Methods, Further Mathematics and Specialist Mathematics studies. Each trial exam features: Original questions, highly relevant to the current course, fully worked solutions for all sections and clear marking schemes. Exam formats are similar to those used by the VCAA. The purchasing institution has permission to reproduce copies for its students.

INDIVIDUAL STUDY \$221.70 (MEMBER)
\$277.10 (NON MEMBER)

ALL STUDIES \$511 (MEMBER)
\$639.80 (NON MEMBER)



IF THE WORLD WERE 100 PEOPLE

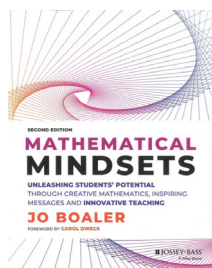
3-7

Imagine the world's population as 100 people: what would it look like?

There are almost 8 billion humans living on Earth, but it's tricky to picture so many people! So instead, let's imagine the whole planet is a village where 100 people live – each person representing around 80 million people in the real world. So what does our global village of 100 people look like? Are they all grown-ups? Are there more males or females? How many have black hair or blue eyes? What languages do they speak? Who can read and write? How many have access to the internet or have enough food to eat? Does everyone have access to electricity or clean water?

Big ideas are broken into bitesize chunks through clever illustration and graphic design.

\$16.90 (MEMBER)
\$21.10 (NON MEMBER)



MATHEMATICAL MINDSETS (SECOND EDITION)

1-VCAL

Reverse mathematics trauma and find a universal blueprint for math success. Mathematics education expert Jo Boaler delivers a blueprint to banishing math anxiety and laying a foundation for mathematics success that anyone can build on.

Perfect for students who have been convinced they are 'bad at maths,' the author offers a demonstration of how to turn self-doubt into self-confidence by relying on the 'mindset' framework.

Mathematical Mindsets is based on thousands of hours of in-depth study and research into the most effective—and ineffective—ways to teach math to young people. This new edition also includes:

- Brand-new research from the last five years that sheds brighter light on how to turn a fear of math into an enthusiastic desire to learn
- Developed ideas about ways to bring about equitable grouping in classrooms
- New initiatives to bring 21st century mathematics to K-12 classrooms

\$36.70 (MEMBER)
\$45.90 (NON MEMBER)



IS 2 A LOT?

F-2

Joey's questions and his mom's artful answers transform an ordinary car ride into a magical odyssey through the land of numbers. *Is Two a Lot?* is a wonderfully charming and authentic exchange between mother and child.

\$14.80 (MEMBER)
\$18.50 (NON MEMBER)



120 BUBBLE BOARD

F-3

Discover place value, skip counting, addition, subtraction and number properties with this durable 'pop and learn' 120s board. The double-sided board features numbers printed in ascending order on the front and descending order on the back. Measures 20.32 x 22.86cm.

\$40 (MEMBER)
\$50 (NON MEMBER)

SESSION DETAILS

FRIDAY 2 DECEMBER 2022

KEYNOTES: Friday, 9.15am-10.15am

KF01 MOTIVATING STUDENTS IN MATHEMATICS THROUGH CONCEPTUAL PLAYWORLDS AND REALWORLD SITUATIONS

(Improving individual and societal outcomes, Technology to enhance investigation, Exploring effective pedagogies, Valuing evidence)

**Marilyn Fleer, Monash University
(F to Year 6)**

Recently a Year 6 teacher who participated in a curriculum project with the Conceptual PlayLab asked his students if they enjoyed being taught mathematics through the new approach. Every child enthusiastically put up their hand! He said, "If I can engage every child in mathematics, then I am going to teach like this all the time!" In this session we will move from creating engaging moments in mathematics to planning and fostering how to motivate child mathematicians. We will introduce a Conceptual PlayWorlds for Foundation-Year 4 and RealWorld situations for Years 5-6 students, and discuss this model as the basis for motivating and engaging students. Our evidence-based model has come from 20 years of research into imagination in STEM and imagination in play. Through video examples of real-world practices from Laburnum Primary School we will explore the 5 planning characteristics of this model for successfully engaging and motivating students in mathematics.

KF02 FROM PROBLEM SOLVING AND REASONING → UNDERSTANDING AND FLUENCY

(Exploring effective pedagogies)

**Jill Brown, Deakin University and Melanie O'Reilly,
Findon Primary School
(Year 3 to Year 6)**

Mathematics can be challenging to teach and to learn. Improving the quality of teaching and learning mathematics occurs when both teachers and students work together. Jill (mathematics education researcher) and Mel (School Mathematics Leader) spent 5 years working together with teachers and students in one Primary School. Our keynote will present and discuss some ideas we used to motivate and engage learners in mathematical activity. We will illustrate approaches to developing the capacity of learners to collaborate and communicate mathematical ideas. Our focus was on all the four proficiencies and development of

a productive disposition toward mathematics. We will share tasks and pedagogical approaches to effectively engage students in problem solving and mathematical reasoning which also developed conceptual understanding and procedural fluency.

Supported by



KF03 VALUING AND EXPLORING HOW TECHNOLOGY ENHANCES MATHEMATICAL INVESTIGATION AND DISCOVERY

(Technology to enhance investigation)

**Thomas Moore, EngageME Mathematics, Rachael Whitney-Smith, Australian Curriculum Assessment and Reporting Authority (ACARA), Peter Fox, Texas Instruments and Allason McNamara, Trinity Grammar School
(Year 7 to Year 12)**

The panel will discuss how technology in the classroom may enhance student learning, provide opportunities for mathematical exploration, deep thinking, developing the proficiencies, and enhancing engagement. It may provide opportunities for collaboration, demonstrating algorithmic thinking, modelling, and exploring real world data to contextualise learning. Some technology may also provide analytical data to support monitoring student progression. However, technology can lead to inequality of access, distraction and procedural learning focusing on skill and drill reflecting a lack of reasoning. Some topics require the use of technology e.g. statistical graphing in the middle years. All the VCE mathematical study designs mandate appropriate use of technology. How do you use technology to achieve goals and meet requirement? How can technology enhance mathematical investigation and discovery for students? Join us at this panel keynote to explore and challenge thinking on how we value technology. We will focus on the advantages technology brings when used effectively as a teaching and learning tool and discuss ideas to remove technology roadblocks that may exist, to enhance your own implementation.

MATHEMATICS TEACHING toolkit



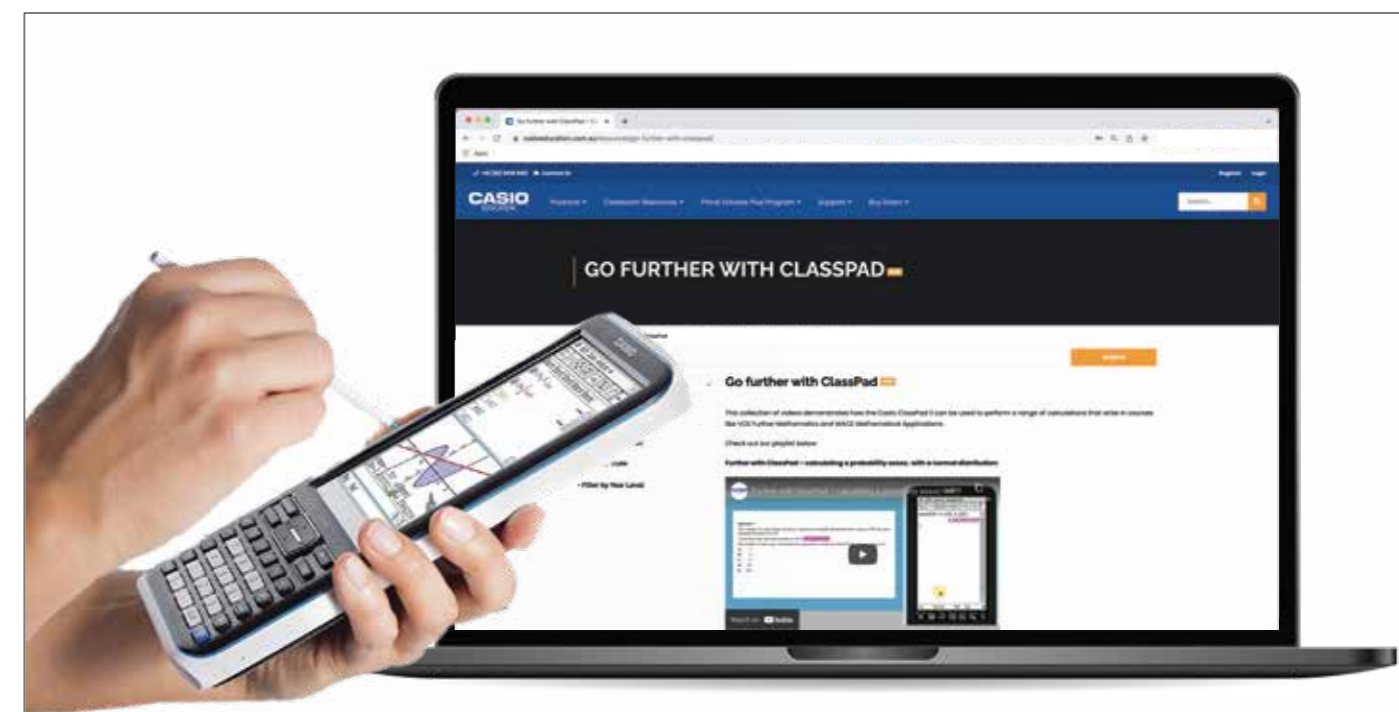
Evidence-based approaches for effective numeracy and mathematics teaching from birth to Level 10 can be found in the department's Mathematics Teaching Toolkit.

New resources include Middle Years Maths Challenges and an extension of the Foundation to Level 2 suite of resources to include the Flip Make Play Cardsets and a Teacher Guide for the Mathscots animation series.

Mathematics Monographs exploring research and evidence in key focus and Numeracy Across the Curriculum (Level 7 to 10) resources are now available.

Find out more:

www.education.vic.gov.au/mathstoolkit



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KEYNOTES: Friday, 9.15am-10.15am (cont.)

KF04 PROBLEM SOLVING AND REASONING CAN BUILD MATHEMATICAL UNDERSTANDING AND FLUENCY

(Exploring effective pedagogies)

Peter Sullivan, Monash University
(Year 7 to Year 10)

Problem solving and reasoning can be learned. Problem solving and reasoning can foster understanding and fluency rather than being merely the application of those proficiencies. Using examples from the secondary curriculum, the presentation will elaborate how effective pedagogies can engage and equip students to be problem solvers, and critical and creative users of mathematics.

Brought to you by



KF05 MATHEMATICS EDUCATION: CHANGING TIMES, CHANGING PRACTICES

(Technology to enhance investigation, Exploring effective pedagogies, Valuing evidence)

Catherine Attard, Western Sydney University
(F to Year 8)

Mathematics education is evolving. The past two years have seen unprecedented interruptions to education due to COVID-19 and interruptions such as these are rare occurrences. As mathematics educators we need to use this moment in time, against the backdrop of significant curriculum renewal, as an opportunity to reflect on what we learned during the disruptions. In response, we need to recalibrate our practices: change what we do and how we do it to enhance the learning and engagement of our students. Then, we need to refocus and move forward with delivering high quality, effective mathematics education that suits the needs of every learner, everywhere, every time. In this keynote I will discuss aspects of mathematics education that are critical for student success such as student engagement, the use of digital resources, and effective assessment and planning in mathematics. Suitable for P-8.

Brought to you by



Australian Curriculum • NSW Syllabus • Victorian Curriculum

ONLINE SESSION: Friday, 10.25am-10.55am

THESE SESSIONS ARE ONLINE ONLY AND WILL RUN DURING MORNING TEA

OF 01 USING THE PLACE VALUE ASSESSMENT TOOL (PVAT) TO GUIDE YOUR PLACE VALUE TEACHING IN 2023

(Valuing evidence)

Angela Rogers RMIT University
(Year 3 to Year 6)

Are you looking for a free comprehensive assessment to guide your teaching of place value in 2023? The Place Value Assessment Tool (PVAT) is a valid and reliable whole number place value paper and pen assessment for Year 3-6 students. Ange developed this assessment in her PhD research. In this session she will demonstrate how you can use the data your class or school gathers from the PVAT, to structure your planning and teaching of place value both in Term 1 and beyond. Ange will share ideas for moderating the data, and how creating and using a Guttman chart can assist you to analyse potential instructional gaps that may appear in your teaching of place value. You will walk away from this session with a clear understanding of how the PVAT can support your school to develop a whole school focus on place value through the use of the six aspects of place value.

OF02 A SCHOOL WITHOUT BOOKS

(Exploring effective pedagogies)

Doug Williams Mathematics Centre
(F to Year 6)

Not possible! A school without books would have an impoverished curriculum. Books are chosen by students for fun and lead to literacy and literary adventures. Books are chosen by teachers for small group and whole class adventures. It's the same with maths tasks. Chosen by students for fun and leading to skill development and reasoning adventures. Chosen by teachers for small group or whole class mathematical adventures. And they are the only problem solving resource that integrates the use of concrete materials. In this workshop you play with sample tasks and learn how to create your own Task Library within an on-going, self-directed professional development programme.

OF03 CREATING MATHEMATICAL INVESTIGATIONS & SACS IN GENERAL MATHS UNITS 1 - 4

(Improving individual and societal outcomes)

Kevin McMenamin Mentone Grammar
(Year 11 to Year 12)

The 2023 Study Design sees an increase in weighting allocation (Unit 3 and 4) to School Assessed coursework to 40% of overall assessment as compared to 34% in current study Design and an introduction of Mathematical Investigations to the Unit 1 and 2 level. With the increased emphasis on school assessed coursework it is important teachers are aware of how to write, develop and assess, (according to criterion mapping), appropriate Application and Modelling and Problem Solving Tasks. This session will outline all these aspects.

OF04 PYTHON FOR VCE MATHS TEACHERS

(Technology to enhance investigation)

Robin Wang, Preshil Secondary College
(Year 11 to Year 12)

Computational and algorithmic thinking has become an essential component in the new VCE mathematics study design (2023-2027). This tutorial aims to equip VCE maths teachers with fundamental coding skills for them to better integrate computational and algorithmic thinking in their maths class. An elegant computing programming language - Python is chosen due to its easy readability and interactive mode. In this tutorial the basics of Python will be walked through. Two unique but very useful features of Python: list comprehension and functional programming will be explored. In the end, matrices and graphs will be introduced with Python along with three selected algorithms in graph theory.

ONLINE SESSION: Friday, 10.25am-10.55am

THESE SESSIONS ARE ONLINE ONLY AND WILL RUN DURING MORNING TEA

OF05 VALUING SCIENTIFIC CALCULATORS IN A CHANGING WORLD

(Technology to enhance investigation)

Barry Kissane, retired teacher
(Year 6 to Year 10)

Scientific calculators are frequently misunderstood as supporting only numerical calculation, so that many learning opportunities are missed. However the major educational purpose of calculators is to provide students with opportunities to experience mathematics through personal activity, and modern calculators have been designed accordingly. This presentation will demonstrate some examples of this, focusing mostly on the Number and Algebra strand, including fractions, decimals, surds and functions.

OF06 PROBLEM SOLVING: GETTING THEM ALL ABOARD

(Exploring effective pedagogies)

Mark Ljubic and Andrew Greville, St. Joseph's Secondary College Mildura

(Year 5 to Year 10)

Reflections from Mark....

I was in Year 7 in 1981. What a great year to start high school. My teacher Mr Greenwell wasn't your everyday sit down and do the left-hand side of the book teacher. Instead he threw down challenges that got us thinking about the process of tackling his at times off-beat questions. His questions, although open-ended, invited responses from all members of my mixed ability class as he sat in the front of the class and teased the answers from us. Today we hope to recreate those great moments as we look at 1981 more closely. Are you ready for the 1981 challenge?

OF07 WHAT IS 'BEST PRACTICE' IN 2022? WHAT IS GREAT TEACHING? WHAT ARE OUTSTANDING PEDAGOGIES?

(Exploring effective pedagogies, Valuing evidence)

Jennifer Bowden and Peter Saffin, The Mathematical Association of Victoria

(F to Year 6)

What is 'best practice' in 2022? Let's explore some aspects of great teaching and outstanding pedagogies to kick off our day. We need our students to be able to do mathematics, and value it! They need to understand why it's important, as they require it for success in everyday life. Maths anxiety and disengagement can leave students feeling that maths is disconnected from their lived experience, and that mastery is required to feel success. Traditional approaches can create pass or fail situations (think tick or cross) that put students under stress and make students feel they can't succeed. Good teachers mix approaches; inquiry-based learning, warm-ups, number talks, discussion and exploring the proficiencies, supported by explicit instruction, prompts, differentiation and

other techniques allow teachers to select the best approach for their students at their point of need, and in a typical mixed ability classroom not all students need the same instructional approach at the same time. Let's explore techniques educators can use, and how can you add to your repertoire.

OF08 WORTHWHILE CAS CALCULATOR USE IN THIS YEAR'S MATHEMATICAL METHODS EXAM 2

(Technology to enhance investigation)

Kevin McMenamin Mentone Grammar

(Year 9 to Year 12)

Routine and clever use of the CAS calculator in past Methods 2 examinations has shown it to be advantageous and worth the time and effort in getting to know it works. Generally, half of the multiple choice questions and many parts of the extended answer questions benefit from good calculator skills. This hands-on session will get you using the calculator to see just how helpful (or not) it was with this year's questions. The most efficient methods will be presented and questions where the calculator should be avoided will be pointed out. The session is suitable for TI-Nspire and ClassPad users and the Casio ClassPad will be the featured CAS.

ONLINE SESSION: Friday, 10.25am-10.55am

THESE SESSIONS ARE ONLINE ONLY AND WILL RUN DURING MORNING TEA

OF09 INTEGRATING 'MATHTASK' IN MIDSENIOR

LEVEL MATHEMATICS CLASSROOM: A POWERFUL PEDAGOGICAL TOOL TO PROMOTE STUDENTS' CONCEPTUAL UNDERSTANDING AND CONNECTION

(Exploring effective pedagogies)

Jiqing Sun Deakin University

(Year 10 to Year 12)

In many mid-senior level (i.e. Year 10 – 12) classroom, despite teachers understand underlining concepts and connection amongst these concepts are important, the practical teaching might be heavily 'procedure' orientated due to the pressure brought from tight curriculum timeframe and high-stake exams. In this sense, more pedagogical supports are needed so teachers are able to teach beyond 'procedures' in everyday practice. 'MathTask' provides a range of mathematical problems, and many of them are exam style questions, which can elicit deeper discussion around a particular topic. In this report, I will showcase how some of 'MathTask' problems can be utilised in everyday mid-senior level classrooms. My intention is to show how teachers can use this kind of problems as a pedagogical tool not also to cater for needs of the high-stake exam, but also enhance students' conceptual knowledge and its connection.

SESSION E: Friday, 11am-11.50am

E01 PROBLEM SOLVING AND REASONING CAN BUILD MATHEMATICAL UNDERSTANDING AND FLUENCY - PRIMARY

(Exploring effective pedagogies)

Peter Sullivan, Monash University
(F to Year 6)

Problem solving and reasoning can be learned. Problem solving and reasoning can foster understanding and fluency rather than being merely the application of those proficiencies. Using examples from the primary curriculum, the presentation will elaborate how effective pedagogies can engage and equip students to be problem solvers, and critical and creative users of mathematics.

E02 WORKING SMARTER, NOT HARDER AS A NUMERACY LEADER

(Exploring effective pedagogies, Valuing Evidence)

Angela Rogers, RMIT University
(F to Year 6)

Are you a Numeracy Leader? Do you feel stretched covering everything required of you in your role? Do you find it challenging to strike a balance between modelling in classrooms, supporting teachers in planning, facilitating PLTs, and keeping the maths resource room in order! If this is something you struggle with (and let's face it, who doesn't?!), this session is for you! In this practical presentation, Ange will run through her top 10 tips for working smarter not harder as a Numeracy Leader. Ange will present ideas around intervention, enrichment, yearly planning, unit planning, selecting quality assessments, running PLTs, modelling lessons, selecting resources and developing a community of learners among your staff. You will walk away from this session with simple but effective changes you can make to begin 2023 with a fresh, streamlined approach to leading change in your school.

E03 2021 MATHEMATICAL METHODS EXAMINATIONS

(Improving individual and societal outcomes, Valuing evidence)

Allason McNamara, Trinity Grammar School and
Cathy Devlyn, Fintona
(Year 11 to Year 12)

Allason and Cathy will do a similar session to the 2022 MAV Meet the Examiners Lecture for Mathematical Methods.

They will discuss common errors that students made on the 2021 examinations. Cathy will talk about Exam 1 and Allason Exam 2. The statistics for each question will also be shown.

E04 2023 FOUNDATION MATHEMATICS UNITS 3 AND 4: AN OVERVIEW AND INFORMATION SESSION

(Improving individual and societal outcomes)

Kevin McMenamin, Mentone Grammar
(Year 9 to Year 12)

The new Study Design has expanded the initial offering of Foundation Mathematics to now include Units 3 and 4. This session will provide an overview of the study, present general information on a suitable course and work through some possible Mathematical Investigations. This session would be suitable for those new to teaching this study of Mathematics.

E05 HOW TO BUILD MATHEMATICAL THINKING WITH GAMES

(Exploring effective pedagogies)

Michaela Epstein, Maths Teacher Circles
(Year 3 to Year 10)

Too often, maths is considered dry and confusing. But, yet it can offer so much more than these stereotypes suggest. In this session, you'll look at a side of maths that is fascinating, fun and gives learners of all ages experiences that leave them hungry for more. With a focus on mathematical games, you'll explore how to not only support students to view maths differently, but to also help them become stronger mathematical thinkers.

E06 PATTERNS IN ART AS MATHEMATICS ENRICHMENT

(Exploring effective pedagogies)

Jennifer Palisse, Monash Tech School
(Year 5 to Year 8)

Looking for in-depth investigation projects for students who love to draw? In this session, we will show case some activities we have used as part of our Supersigma program, an enrichment program that forms part of the Victorian Challenge and Enrichment Series. In this workshop, we will explore patterns within spirographs, string art, and spiralling squares. Each task involves an engagement artistic component as well as an open-ended investigation drawing from mathematics beyond the curriculum. Mathematical skills required involve fractions and modular arithmetic. Tasks are highly differentiable and suitable for upper primary to middle secondary students.

E07 VISUALISING DECIMAL PLACE VALUE TO BUILD UNDERSTANDING

(Achieving greater equity, Exploring effective pedagogies, Valuing evidence)

Antje Leigh-Lancaster, Leigh-Lancaster Consulting
(Year 3 to Year 8)

One of the challenges when developing understanding of decimal place value is to represent the size of the smaller place values in correct proportion. In this hands-on session you will have the opportunity to engage with a fresh approach to introducing decimals (10ths, 100ths and 1000ths) using a combination of printed numberlines, number talks and a specially developed numberline template in Excel. One of the benefits of using a spreadsheet is the visual representation of decimal place value and the relationships between them. This also leads nicely into equivalence and rounding. Handouts and the Excel template will be shared with participants. Participants are encouraged to bring a laptop.

E08 FUN WITH DRAWINGS USING TI-NSPIRE, FOOTY JUMPERS SHAPES AND COLOURS

(Technology to enhance investigation)

Raymond Rozen, RMIT and Shane Dempsey,
Hamilton College
(Year 11 to Year 12)

The latest version of TI-Nspire has intrinsic functions to draw and fill shapes. In this hands-on session we will use TI-Nspire to write programs to draw and colour some of the AFL footy teams jumpers. Come along to this colourful activity and use coordinate geometry and learn STEM concepts and programming skills. Please bring along a TI-Nspire CX II CAS calculator, or your laptop with TI-Nspire.

E09 MATHEMATICAL INVESTIGATIONS - IDEAS FOR THE NEW VCE UNIT 1 & 2 COURSES

(Exploring effective pedagogies, Technology to enhance investigation)

Peter Fox, Texas Instruments
(Year 11 to Year 12)

Looking for some free, ready to use Mathematical Investigations for 2023? Teachers in this session will be provided with a selection of Mathematical Investigations and choose which ones they would like to immediately explore. Sample contexts include: Fibonacci Sequence (including

pseudo code opportunities), modelling and qualitative analysis of rates of change from real data, modelling superannuation and simulations to investigate the sample mean distribution of an experiment. Content will also be available in Word format so teachers can edit to suit individual needs and technology platforms. Examples focus mainly on Unit 1 & 2 VCE Mathematics courses – General + Methods + Specialist

E10 MATHS IN SCHOOLS: NATIONAL TEACHING AND LEARNING RESOURCES TO SUPPORT MATHEMATICS AND NUMERACY

(Exploring effective pedagogies)

Debbie Reinholdt, The University of Adelaide, Genovieve Grouios, CSER STEM Team-Maths in Schools and John West, Mathematical Association of Western Australia (MAWA)
(F to Year 10)

The Maths in Schools project is a collaborative national project funded by the Australian Government Department of Education, Skills and Employment (DESE) and delivered in partnership with Education Services Australia (ESA) and the University of Adelaide (UoA). The Maths in Schools project provides free support for mathematics and numeracy teachers of Foundation to Year 10 students through online courses, face-to-face and/or virtual professional learning and provision of a repository of teaching and learning resources through an online Mathematics Hub (Maths Hub) and Numeracy Check. This presentation will introduce you to a suite of professional learning in mathematics and provide an overview of the integrated key components of the project being delivered by the University of Adelaide's CSER STEM Team. Learn about our three free online courses for teachers in Foundation - Year 2, Year 3 - Year 6 and Year 7 - 10 in addition to our suite of webinars and downloadable resources. The resources are designed to be flexible, self-paced and enable contextualisation to suit your local school needs and learning priorities. This presentation is particularly targeted at school and curriculum leaders as well as interested individual teachers including preservice and teachers who are out of field.

SESSION F: Friday, 12pm-12.50pm

F01 CHECKING FOR UNDERSTANDING: ACHIEVING GREATER EQUITY IN THE MATHEMATICS CLASSROOM

(Achieving greater equity, Exploring effective pedagogies, Valuing evidence)

Cassandra Lowry, St Francis of Assisi Tarneit (F to Year 6)

Classrooms are busy places and too often, as teachers, we hurry through a lesson by seeking responses from a handful of more capable students. This process can have a negative effect on achievement as students will wait for others to respond, be reluctant to share their own approaches and may begin to form ill-conceived beliefs around the importance of speed and assertiveness. This workshop will look to build on the ideas of Rosenshine's Principles of Instruction by suggesting practical ways that teachers can check for student understanding using more inclusive strategies. It will demonstrate how these strategies can be used to increase active participation within the classroom and at the same time promote greater equity across the learning community.

F02 WHAT IS THE PURPOSE OF THIS LESSON? EFFECTIVELY HARNESSING LEARNING INTENTIONS AND SUCCESS CRITERIA

(Exploring effective pedagogies)

Niyati Robson and Jayde Cairns, Regency Primary School (F to Year 6)

This presentation is about the effective use of learning intentions and success criteria in planning and delivering mathematics lessons, and using them as a driving force to convey the purpose of the lesson. Very often the learning intention and success criteria are written based on curriculum outcomes, and teachers are so focussed on those that the purpose of the lesson is lost. This presentation looks at real world mathematics lessons within an inquiry based instructional model, and how these lessons can be easily adapted to make them more purposeful for teachers and allow a greater sense of learning ownership for students. By empowering the students to become owners of their learning there is a natural progression across the proficiencies; particularly looking across the problem solving and reasoning proficiencies; encouraging critical, creative, and reflective learning. The lessons have been taught by teachers in Victorian schools, and the reflections and changes made cover learning outcomes as well as formative assessment opportunities throughout, linking to the High Impact

Teaching Strategies. The ideas in this presentation draw on the use of verbs as proficiencies as referenced by Matt Sexton and Peter Sullivan, and the strategies for co-construction of learning intentions and success criteria as a learning assessment tool by Glen Pearsall.

F03 FRACTIONS, DECIMALS AND PERCENTAGES @ YEAR 7

(Exploring effective pedagogies)

Anthony Harradine, Potts Baker Institute, Prince Alfred College (Year 7 to Year 8)

What might the teaching of fractions, decimals and percentages, for both understanding and fluency, look like? What are the critical aspects that should be understood? What level of understanding should be expected? How might we accommodate a variety of levels of prior knowledge, and confidence, in the one classroom? These questions, and others, fuelled 18 months of effort to develop a set of materials that support the teaching and learning of fractions, decimals and percentages @ Year 7. The materials include printable and online components and have been tested with real Year 7 students. In this session I will provide answers to the questions above and introduce the materials to you.

F04 EFFECTIVE USE OF CAS TECHNOLOGY IN 2022 SPECIALIST MATHEMATICS EXAM

(Technology to enhance investigation)

Peideng (Martin) Nie, Austin Education Pty Ltd (Year 11 to Year 12)

This presentation is intended to share effective use of CAS calculators in 2022 Specialist Mathematics Exam 2. The presenter will demonstrate both TI Nspire and Casio CP400. For certain questions, the presenter would possibly demonstrate Mathematica uses. All attendees will receive a copy of presentation material including detailed CAS use for each question and relevant analysis. Similar documents prepared by the presenter for Specialist Mathematics Written Exam 2 (2019NHT, 2020, 2021 and other years) will also be shared with attendees, and these documents can be viewed through via: <https://drive.google.com/file/d/1OCpvJKinHBOwplKOR4u9X3ooxRB8OM4M/view?usp=sharing>

F05 UNPACKING THE MATHEMATICAL PROCESSES IN THE NEW AUSTRALIAN CURRICULUM: MATHEMATICS (SECONDARY)

(Technology to enhance investigation, Exploring effective pedagogies)

Rachael Whitney-Smith, Australian Curriculum Assessment and Reporting Authority (ACARA) (Year 7 to Year 10)

This presentation is aimed at unpacking the mathematical processes in the new Australian Curriculum: Mathematics version 9.0 for Secondary Mathematics teachers. Mathematical modelling, Computational thinking, Statistical investigation and Probability experiments and simulations are not new to mathematics, but are now explicitly included as essential learning in content descriptions and achievement standards in the revised Australian Curriculum: Mathematics. Workshop participants will be provided some background to support their inclusion, examples of how the processes can be developed in practice, links to existing resources, alignment to senior secondary courses and an opportunity for discussion about the impact these have on curriculum planning, classroom pedagogy and assessment.

F06 SIX OF THE BEST- OUR ALL-TIME FAVOURITE MATHS LESSONS

(Exploring effective pedagogies)

Michael Minas, Love Maths and Rob Vingethoets, Consultant (F to Year 6)

Presenting together at a conference for the first time in four years, Mike and Rob bring the energy from their highly successful series of webinars to a live audience. During this hands-on and engaging workshop, they explore their favourite maths lessons of all-time. Attendees will leave the session with a collection of tasks that they can implement back at their own schools straight away. They will also gain an understanding of the pedagogy behind each of these lessons and how this information can be used more broadly to enhance maths teaching and learning at their school.

F07 HIGH YIELD DAILY ROUTINES THAT BUILD MATHEMATICAL UNDERSTANDING AND DISCUSSION

(Exploring effective pedagogies)

Elizabeth Irwin, Independent Education Consultant (F to Year 4)

Daily mathematical routines are low preparation and high yield short activities focused on building strong number sense, student engagement, curiosity and classroom discourse. These routines develop critical and creative thinking, reasoning and problem solving with students sharing strategies that make sense to their learning and their peers. This early years focused workshop will immerse participants in various hands-on routines that can be quickly and easily implemented. They are all aligned to the Maths proficiencies and processes of the Australian Curriculum and build rigorous student discussion in the classroom.

F08 CONCEPT-BASED LEARNING IN MIDDLE YEARS MATHEMATICS

(Exploring effective pedagogies)

Guanghua Wu, Oakleigh Grammar (Year 9 to Year 10)

"Mathematics is a concept domain. It is not, as many people think, a list of facts and methods to be remembered." This presentation is based on the presenter's Practitioner Inquiry of the Teaching Excellence Program (TEP) organised by the Victorian Academy of Teaching and Leadership. When students embark on their mathematics learning at their secondary level, particularly in more senior years (Year 9 and above), many of them tend to perceive maths as a subject predominantly based on procedures. They think that as long as they are fluent in the methods, procedures, or formulae of a topic, they would master the topic. Part of the reason for such perception is how teachers approach secondary maths and how popular textbooks are structured. The problem with this procedure-orientated approach is both teachers and students often ignore the conceptual understanding of the topic. Concepts help organise vast amounts of information into manageable units and make sense of new information. Enduring understandings are concepts that are timeless, universal, and abstract. Mathematics teachers must aim at conceptual understanding rather than mere procedural fluency. The inquiry started with a concept-based approach for a Year 9 Linear Relations unit and expanded to other topics of other year levels. By driving teaching and learning

SESSION F: Friday, 12pm-12.50pm (cont.)

with “big ideas” or concepts, teachers are able to help students make connections between discrete facts to build up their schema of knowledge. It also helps teachers decide on the scope and sequence in a way that they teach for deep-understanding rather than trying to “get through the curriculum”. The presentation will share the experience, evidence, and practices in this practitioner inquiry.

F09 GEO-PRO, POLYHEDRA AND 20 FREE WORKSHEETS BOOKS

(Achieving greater equity)

Geoff Phillips, Geoff Phillips Publications
(Year 7 to Year 12)

Author and former secondary teacher Geoff Phillips will take participants on a tour of his latest mathematics template, Geo-Pro, and demonstrate its protractor, map scale, giant polyhedra shapes, 5 mm to 380 mm diameter circle maker and much more. Each participant will receive a free Geo-Pro with 72 page lessons/instructional booklet and free access to 20 free pdf books containing thousands of free worksheets, activities, posters and other resources for dozens of topics across years 7-12 Mathematics. Commercial presentation

F10 INSPIRATIONS FOR USING MATHEMATICS AND CODING IN CLASS ACTIVITIES TO CREATE ARTWORKS

(Technology to enhance investigation)

Georgia Gouros, Virtual School Victoria
(Year 5 to Year 12)

Student activities to encourage conversations, deeper understanding and application of

- 2D Geometry
- Scaling and ratios
- Recursion and fractals

Some ideas will be presented to develop, enhance and consolidate student understanding with artistic project inspirations including: Impossible objects, cardioids, tessellations and L-System recursion.

Mathematics explored, explained and applied by students in activities using technology with coding examples in Scratch, Snap! and Python.

Ensure your students know the fundamentals



With no prerequisites or sign-ups required, this FREE online course is a great resource to support your students' development of TI-Nspire™ CX II CAS technology skills and is suitable for beginners or those wanting to refresh their skills.

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For details, go to education.ti.com/en-au/studentcourses.



SESSION G: Friday, 1.30pm-2.20pm

G01 INDUCTIVE REASONING

(Improving individual and societal outcomes, Valuing evidence)

Terence Mills, Crusoe 7-10 Secondary College, Kangaroo Flat
(Year 7 to Year 12)

Mathematicians are used to encountering problems that are simply stated, yet unsolved. This presentation deals with one such problem in philosophy - the problem of induction. Statisticians employ inductive reasoning when drawing an inference about a population from sample data. Inductive reasoning is used routinely in interpreting the results of applications of statistics in society, scientific research, and everyday life, even shopping. However, there is a long-standing problem with inductive reasoning that philosophers call the problem of induction. When teaching students about probability and statistics, it behoves us to be aware of this problem. The purpose of this expository presentation is to describe the problem of induction and its history. An understanding of induction will enhance the critical abilities of our students to value the role of probability and statistics in today's society. Note that the philosophical problem of induction is different from, but connected to, the principle of mathematical induction; this connection will also be explored in the paper.

G02 FALLING BACK IN LOVE WITH MATHS

(Exploring effective pedagogies, Improving individual and societal outcomes)

Bernard Kerrins, St Francis of The Fields Primary School
(F to Year 8)

For so long we have heard the cliché "I'm no good at maths". An attitude of defeatism often accompanies this. From parents, teachers and students. This workshop addresses this. Why is it seen as acceptable to publicly downgrade our own maths ability rather than strive to be proactive about it? Rediscover your own passion to learn and teach maths and pass on this enthusiasm to your students. Watch your lessons come alive, to the point where you and your students will eagerly anticipate your lessons rather than waiting to rush out of them. This workshop will present and demonstrate proven strategies that engage students and teachers, encourage them to be enthusiastic problem solvers while at the same time improving their capabilities across the maths curriculum. Developing a mindset that is directed towards becoming more involved in maths will be a focus. Practical ideas and methods will be demonstrated and explained in ways that will

help all participants to value maths more and develop greater self belief in their own ability to learn and teach maths.

G03 GENERATING EQUATIONS AND DATA FROM IMAGES PRODUCED BY STUDENTS

(Technology to enhance investigation)

Stephen Broderick, St Ursula's College, Toowoomba
(Year 7 to Year 12)

Images produced by students tracing out various curves will be analysed with TI-Nspire software to determine the nature of these curves which will include ellipses, parabolas and linear equations. This process is then extended to determine the eccentricity of the Earth's orbit around the Sun. Images of the Great Red Spot (GRS) will be used to develop a model for its disappearance this century. Further activities include determining the distance to the International Space Station (ISS) as it transits the Moon and determining the heights of mountains and the depths of craters on the Moon from shadows. The relationship between brightness, altitude and distance to the ISS will also be investigated.

G04 EXPLORING TEACHING & LEARNING OF MATHEMATICAL REASONING

(Achieving greater equity, Exploring effective pedagogies, Valuing evidence)

Hannah Young and Dilys Potter, Collingwood College
(Year 7 to Year 10)

Collingwood College is a culturally diverse school with a broad spectrum of students; from those with significant gaps in their schooling to those with exceptional maths skills, both EAL learners and native English speakers. During this presentation, we will share how we create and teach a unit that is inclusive of all students and provides all learners an opportunity to deepen their skills in mathematical reasoning creating. We have focused on reasoning as a way of supporting our learners to be able to use their mathematical skills in a changing world. We will share how we have incorporated resources from the Reframing Mathematical Futures II project to evaluate our teaching practice and differentiate our curriculum using a learning continuum.

G05 REPLACING TRADITIONAL TEXTBOOKS WITH INNOVATIVE TECHNOLOGY

(Technology to enhance investigation, Valuing evidence)

Daniel O'Kane, Mathspace and Vaughan Nikitin, Fitzroy High School
(Year 3 to Year 12)

Vaughan Nikitin is the Head of Mathematics at Fitzroy High School. Instead of using traditional textbooks, Vaughan and his team use Mathspace for both teaching & assessment of mathematics skills and concepts, particularly those involving two of the four proficiencies Fluency and Understanding.

Using a data-driven approach, the school is able to quickly identify learning gaps amongst their students, provide targeted intervention and instill growth mindsets, so that all students can experience success in mathematics across all four proficiencies including Problem Solving and Reasoning, regardless of their identified grade level.

Describing himself as an "open-source kind of guy", Vaughan will share his school's approach to mathematics instruction. This is the perfect opportunity to learn from an experienced digital educator.

G06 PICTURE BOOKS - A SPRINGBOARD FOR EFFECTIVE MATHS TEACHING

(Achieving greater equity, Improving individual and societal outcomes, Exploring effective pedagogies, Valuing evidence)

Jennifer Bowden, Mathematical Association of Victoria and Sheila Griffin, Association of Independent Schools Western Australia

(F to Year 4)

Picture books are a springboard for creative and critical teaching where students can make strong mathematical connections between concepts and language. Picture books contain both imagery and dialogue that can ignite curiosity and in which teachers can create purposeful and innovative learning tasks. In this workshop, we will investigate how quality picture books can lead to tasks that develop deep mathematical understandings for our students. In addition, we will look at a range of tasks that utilise the mathematical proficiencies, effective pedagogies and assessment opportunities. We will discuss thoughtful choices of picture books, considering students academic and personal requirements and the lifelong students can make on our world.

G07 BAD GRAPHS, GREAT EXAMPLES

(Exploring effective pedagogies)

Kate Copping, University of Melbourne
(Year 3 to Year 8)

This workshop examines the use of a variety of statistical representations to promote critical thinking and statistical literacy. Analysing data sources and interpreting graphical representations is a necessary component of being numerate. Many students can form graphs, but have difficulty interpreting them. Poor examples of graphs in the media influence how people interpret important information regarding current issues such as the environment, health, and finance. The use of poor or incorrect examples of graphs and other forms of data representation, can help students to identify bias. Non-examples also assist in the identification of important considerations for construction of student's own data representations. This workshop will examine samples and how they could be used in the classroom. Commercial Presentation

G08 FOUNDATION MATHEMATICS: HANDS ON EXPERIENCES

(Achieving greater equity)

Marilyn Hand, Educator
(Year 11 to Year 12)

How often do we hear adults say, I can't do Maths? The obvious effect of this lack of self-belief is that they feel that they can't assist their Secondary school children with Maths homework. The subtle, insidious effect is that the children believe that the same will be true for them. Mathematics should not be for tests and exams. If we are creative, the mathematics skills and knowledge that we teach can metaphorically be put into the students' back pockets and taken out into their real worlds. The workshop Foundation Maths: Out and About, will provide participants with hands-on experience of how to apply the learning in Foundation Mathematics in engaging and inspiring activities that will excite and empower their students.

SESSION G: Friday, 1.30pm-2.20pm (cont.)

G09 WHO CARES ABOUT SCIENTIFIC CALCULATORS?

(Exploring effective pedagogies, Technology to enhance investigation)

Alastair Lupton, Adelaide Botanic High School
(Year 7 to Year 10)

Once upon a time, scientific calculators were a big deal, back in the day ... but, with the explosion of other electronic technology in the mathematics classrooms, including graphing and CAS calculators, alongside laptops and tablets accessing powerful online apps, are they still relevant? Does it matter what calculative tool(s) our students in the middle years get their hands on? Does it matter how number is represented? How algebra is first interacted with? Statistical calculations performed? Should this use be planned, and what happens if it is not? These questions will be discussed and stock will be taken of the technology options in the middle schools of 2022.

G10 CREATING SUCCESSFUL PROBLEM SOLVING LESSONS

(Exploring effective pedagogies)

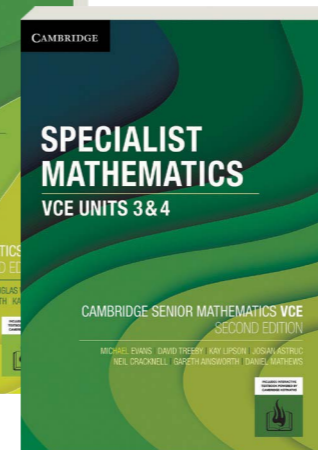
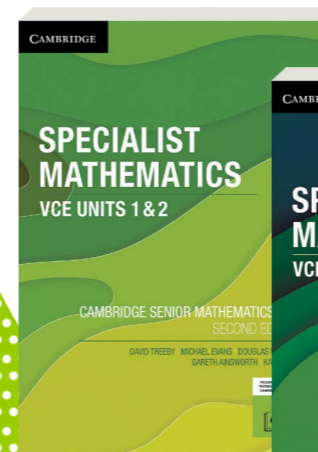
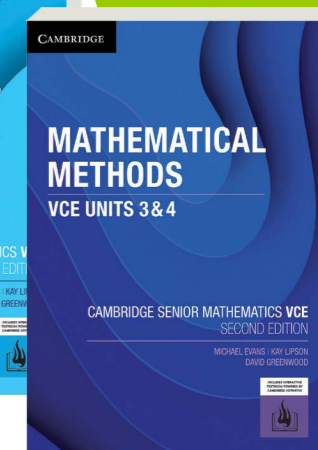
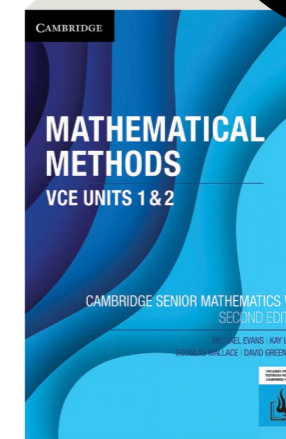
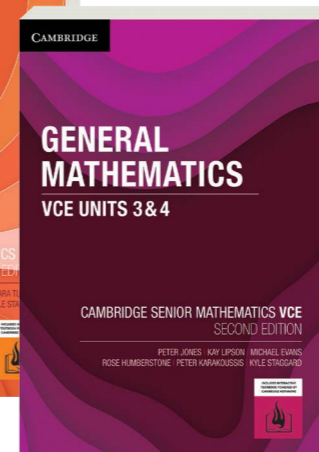
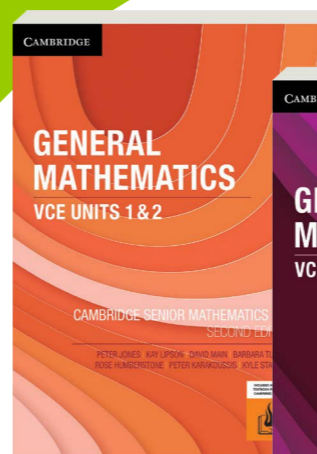
Jill Cheeseman, Monash University
(F to Year 4)

In this workshop participants will share successful ideas for mathematical problem solving in the primary school. Lesson plans that use manipulatives, literature as a stimulus for problem posing, everyday objects, and games, will be examined by participants. We will describe and discuss features of successful lessons with younger students and productive approaches to problem solving. Everyone is encouraged to bring along examples of lessons that work for them.

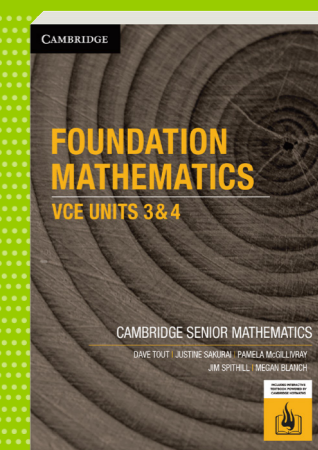
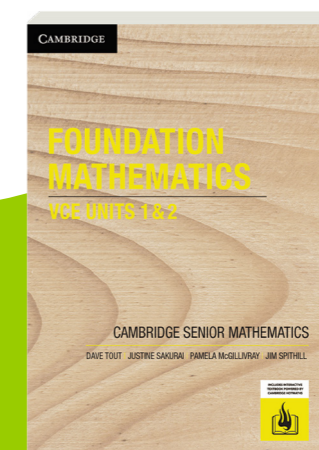
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SESSION H: Friday, 2.30pm-3.20pm

H01 MIND YOUR MATHEMATICS LANGUAGE!

(Exploring effective pedagogies, Valuing evidence)

Vicky Kennard, Monash University
(F to Year 8)

Mathematics is a language, and how we speak to our students makes a difference! Vocabulary, grammar, and syntax are critical features of any language, including mathematics. In this presentation, I will be looking at some of the common words, phrases and symbols we use when teaching mathematics and how they can lead to confusion and misunderstanding. By being careful with our use of mathematical terms and encouraging our students to use them correctly, we can increase student understanding and success with mathematics.

H02 WHAT THE HECK IS A REKENREK?

(Exploring Effective Pedagogies)

Amy How, Amy How Limited
(F to Year 6)

Have you heard about this versatile, visual, concrete manipulative? Perhaps you are curious... or even sceptical? This is your chance to have a go at a few hands-on tasks. You will be amazed at how this tool can be the mess-free answer for children developing deeper understanding of number sense. If you are interested in encouraging mathematical talk, reasoning, deeper understanding and daily practice in a hands on visual method, then this session is for you. You will get a chance to try it out and learn the basics. You truly have to see it to believe it. Join in on the rekenrek workshop and you too will be singing the praises of this simple tool.

H03 TO KNOW AND GROW YOUR STUDENTS THROUGHOUT AN EVER-CHANGING WORLD.

(Valuing evidence)

Jacinta Browning and Jacqueline Clark, Essential Assessment
(F to Year 10)

In this presentation we will introduce our assessment model aligned to the Victorian Curriculum F-10, which supports teachers to make data-informed decisions. As classroom teachers, we will share authentic classroom experiences of our differentiated Numeracy assessment and curriculum model, which diagnostically assesses each student. The presentation

will highlight the use of Individual and whole class data to target each student's Zone of Proximal Development and identify a learning pathway to foster student growth, engagement as well as mapping of students to the National Numeracy Progressions. A special highlight will also include powerful ways to support parent partnerships with schools. All participants will receive 45 day complimentary use of the platform.

H04 TRANSFORMING FUNCTIONS AND LEARNING

(Technology to enhance investigation)

Peter Fox, Texas Instruments
(Year 9 to Year 12)

Ask your students to explain why $f(x+3)$ is a translation in the negative x direction but $f(x)+3$ is a translation in the positive y direction. Sliders might provide visuals, but do they don't necessarily provide understanding? In this session we explore a range of techniques to help understand transformations, including those tricky dilation questions! A range of tried and tested activities will also be covered to help students remember.

H05 TEACHING MATRICES AND NETWORKS IN VCE GENERAL MATHEMATICS UNITS 1-4

(Technology to enhance investigation)

Jess Mount, Mathematical Association of Victoria
(Year 11 to Year 12)

Teaching networks and matrices for the first time in VCE General Mathematics can be daunting if the content is unfamiliar. With the change of mathematics study design being implemented in 2023 this session will look at introducing both modules into Units 1 & 2 VCE General Mathematics as well as content for Units 3 & 4. The session will focus on working through typical VCE examination questions and tips for teaching networks and matrices in VCE General mathematics.

H06 ENABLING & EXTENDING PROMPTS - ARE WE CATERING FOR ALL?

(Achieving greater equity, Exploring effective pedagogies)

Eamon Light, Zebra Stripes Education
(F to Year 6)

This presentation will explore the importance of planning equitable mathematics learning experiences. It will extend

the notion that enabling and extending prompts are more than just "bigger numbers" and how the quality of lessons is dependent on teachers' content and pedagogical knowledge. A low floor/ high ceiling learning experience focusing on multiplicative thinking will be used to explore anticipating student responses and understanding that the key ideas, properties of multiplication and types of division should be considered in collaborative planning.

H07 STUDENT CHOICE IN ASSESSMENT AND OTHER IDEAS TO FOSTER PROBLEM SOLVING

(Improving individual and societal outcomes, Exploring effective pedagogies)

Geoffrey Menon and Ursula Parker, Camberwell High School
(Year 9 to Year 12)

We will discuss a variety of approaches used to foster problem solving at Camberwell High School, including student choice in assessment, mathematical investigations and opportunities within the school's Launch program.

H08 WARM UPS AND LESSON STARTERS TO HOOK IN YOUR STUDENTS

(Improving individual and societal outcomes)

Helen Haralambous, Mathematical Association of Victoria
(Year 7 to Year 10)

A key component to engaging students is to get them hooked in at the beginning of the lesson. In this hands-on workshop for teachers of year 7 to 9, participants will explore activities that will warm up students in readiness for the lesson. The activities have potential to cater a multiple levels and engage all students.

H09 CLASSPAD IN YEAR 12 EXAMS - GENERALLY SPEAKING

(Technology to enhance investigation)

Alastair Lupton, Adelaide Botanic High School
(Year 11 to Year 12)

CAS technology is a part of the learning and assessment in all VCE mathematics courses, but just what functionality, of a powerful tool like a ClassPad, is useful in General Maths? Whilst the 'high end' CAS commands might be less useful, functionality involving matrices, recurrence relations, financial applications, statistical calculations, and the solutions to

equations can prove very helpful indeed. In this workshop we will discuss the functionality called for in recent exams, through the lens of the new Study Design. Video solutions to the 'top 10' will be shared, with a view to making sure all students have the technology skills they need to learn and achieve their best.

H10 CRYPTOGRAPHY IN MATHS CLASSROOM

(Exploring effective pedagogies)

Echo Gu, Lauriston Girls' School and Jiqing Sun, Deakin University
(Year 7 to Year 10)

This session explores some cryptography algorithms that are suitable for use in secondary school maths classes. It could help students to develop their computational thinking through mathematical modelling. A modern application of mathematics, public key cryptography, is discussed. It highlights various areas of mathematics that underpins the algorithms and lets participants gain an understanding of fundamental cryptographic concepts.

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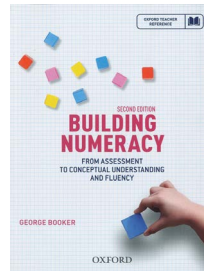


NUMEROUS CONNEXIONS: FAMILY CARD SET 2

1-5

Helps parents promote place-value learning and positive attitudes towards maths at home. Each set includes 36 playing cards which show different and unfamiliar representations of numbers. There are eight starter activities in each set and ideas to help parents encourage mathematical thinking as players explain how numbers are built from their parts, compare and order different quantities and recognise equivalent representations.

\$25 (MEMBER)
\$31.20 (NON MEMBER)



BUILDING NUMERACY SECOND EDITION

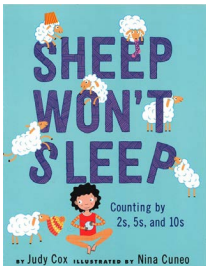
3-10

Building Numeracy has been designed to assist all teachers, at all levels, to develop expertise and confidence in diagnosing student difficulties.

This book uses evidence-based, peer-reviewed intervention strategies that help teachers to:

- understand how mathematical concepts and processes are constructed and connected
- overcome mathematical misconceptions and inappropriate ways of thinking
- plan and implement appropriate intervention programs to build students' competence and confidence.

\$73.50 (MEMBER)
\$88.20 (NON MEMBER)

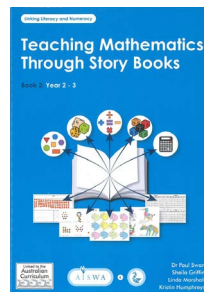


SHEEP WON'T SLEEP

F-2

Counting sheep is supposed to help you sleep — but a room full of yaks, alpacas, and llamas would keep anyone awake. A glass of warm milk, reading, working on her knitting — nothing can help Clarissa get to sleep. When even counting sheep doesn't help her doze off, she tried pairs of alpacas instead. Two, four, six . . . then llamas by fives . . . then yaks by tens! Determined to unravel her problem, Clarissa counts back down until she's all alone, and she can finally get some rest. Introducing addition and subtraction by ones, twos, fives, and tens. A perfect way to introduce and reinforce counting in groups.

\$16.90 (MEMBER)
\$21.10 (NON MEMBER)

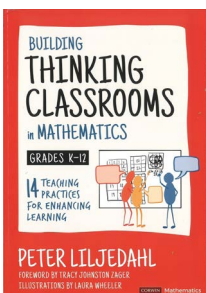


TEACHING MATHEMATICS THROUGH STORY BOOKS

2-3

Children's story books are a fantastic tool in every early childhood teacher's toolbox. This book takes the most popular story books and provides a number of mathematical activities for students to do based off the story book; for example investigating patterns in Lynley Dodd's *Hairy Maclary from Donaldson's Dairy* or investigating the months of the year in Penny Matthews' *A Year on Our Farm*. The book includes copiable resources to make using the activities a breeze. Each story book is given multiple mathematical activity options. Includes assessment opportunities.

\$25.80 (MEMBER)
\$32.20 (NON MEMBER)

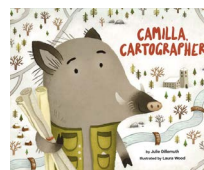


BUILDING THINKING CLASSROOMS IN MATHEMATICS

K-12

Teachers often find it difficult to implement lessons that help students go beyond rote memorisation and repetitive calculations. Sparked by observing teachers struggle to implement rich mathematics tasks to engage students in deep thinking, this book helps teachers implement optimal practices for thinking and deep mathematics learning to occur.

\$56 (MEMBER)
\$70 (NON MEMBER)



CAMILLA, CARTOGRAPHER

F-3

Camilla loves maps - old ones and new ones. She often imagines what it must have been like to explore and discover a new path. One morning, Camilla wakes up to a huge snow storm. Her neighbour Parsley can't find the path to the creek. But Camilla has her old map - which inspires her to make her own path and her own map!

\$31.20 (MEMBER)
\$39 (NON MEMBER)



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