THE MATHEMATICAL ASSOCIATION OF VICTORIA

MAV18 CONFERENCE

6-7 DECEMBER

TEACHERS CREATING IMPACT

CONFERENCE SYNOPSIS

55th Annual Conference
La Trobe University, Bundoora

REGISTER NOW · mav.vic.edu.au/conference · #MAVCON

mav.vic.edu.au

CASIO fx-CP400
CAS Graphics Calculator

FREE CLASSROOM & STUDY RESOURCES AVAILABLE

WINDOWS & MAC EMULATOR SOFTWARE AVAILABLE

INSPIRED BY AUSTRALIAN TEACHERS FOR AUSTRALIAN STUDENTS

For more information please visit www.casio.edu.shriro.com.au

CASIO EDU
www.casio.edu.shriro.com.au

SHRIRO

WELCOME TO MAV18

Welcome to MAV18 – Our theme for this year's conference is Teachers Creating Impact

The Mathematical Association of Victoria invites you to the 55th Annual Conference (MAV18) in Melbourne from Thursday 6 – Friday 7 December 2018

At the heart of MAV's Annual Conference are teachers. Each year over 1400 mathematics educators including teachers, academics, policy makers, curriculum experts and resource developers come together to share their collective expertise, experiences and ideas. That's what makes our conference great!

Learn from each other as we share best practice, new ideas and innovative approaches around how:

- sharing action research and evidence is improving practice
- technology can be used as a valuable tool to support teaching and learning
- critical and creative thinking can be embedded into the classroom
- networks and communities of practice can support excellence and improvement.

Don't miss out on this invaluable opportunity at MAV18 to share and discuss excellence in maths while making social and professional connections in a dynamic environment.

- Ann Downton, Conference Convenor

CONTENTS

SCHEDULE

THURSDAY 6 DECEMBER 2018	
8am-8.50am	Registration and expo open
9am-10am	Session A: Keynote presentations
10.15am-10.50am	Morning tea
11am-12pm	Session B: workshops
11am-1.20pm	Session B-C: workshops
12.10pm-1.10pm	Session C: workshops
1.10pm-2.20pm	Lunch
2.30pm-3.30pm	Session D: workshops
2.30pm-4.40pm	Session D-E: workshops
3.40pm-4.40pm	Session E: workshops
4.50pm-5.50pm	Session EE: Happy hour and competition draw
FRIDAY 7 DECEMBER 2018	
8am-8.50am	Registration and expo open
9am-10am	Session F: Keynote presentations
10.15am-10.50am	Morning tea
11am-12pm	Session G: workshops
11am-1.20pm	Session G-H: workshops
12.10pm-1.10pm	Session H: workshops
1.10pm-2.20pm	Lunch
2.30pm	Registration and exhibition close
2.30pm-3.30pm	Session I: workshops
2.30pm-4.40pm	Session I-J: workshops
3.40pm-4.40pm	Session J: workshops

PROGRAM

THURSDAY 6 DECEMBER 2018	
8am-8.50am	Registration and expo open
9am-10am	Session A: Keynote presentations • A1: Leonie Anstey • A2: Robyn Jorgensen • A3: Lynne McClure • A4: Rob Profitt-White • A5: James Russo • A6: Nicola Yelland
10.15am-10.50am	Morning tea
11am-12pm	Session B: workshops
11am-1.20pm	Session B-C: workshops
12.10pm-1.10pm	Session C: workshops
1.10pm-2.20pm	Lunch
2.30pm-3.30pm	Session D: workshops
2.30pm-4.40pm	Session D-E: workshops
3.40pm-4.40pm	Session E: workshops
4.50pm-5.50pm	Session EE: Happy hour and competition draw

FRIDAY 7 DECEMBER 2018	
8am-8.50am	Registration and expo open
9am-10am	Session F: Keynote presentations • F1: Amie Albrecht • F2: Alan Finkel AO • F3: Tom Lowrie • F4: Tracey Muir • F5: Matt Skoss • F6: Eddie Woo
10.15am-10.50am	Morning tea
11am-12pm	Session G: workshops
11am-1.20pm	Session G-H: workshops
12.10pm-1.10pm	Session H: workshops
1.10pm-2.20pm	Lunch (competition draw at 2pm)
2.30pm	Registration and exhibition close
2.30pm-3.30pm	Session I: workshops
2.30pm-4.40pm	Session I-J: workshops
3.40pm-4.40pm	Session J: workshops

KEYNOTE PRESENTATIONS

In 2018 there will be six Keynote Presentations run at the beginning of each day. There will be a selection of keynote presentations each morning and you will need to choose one of these to attend.

The keynote presentations will be listed online as Session A (Thursday) and Session F (Friday).

EXTENDED SESSIONS

There are four extended sessions, B-C, D-E, G-H and I-J. These sessions run over two one hour sessions plus the break in between (length will vary depending on presenter/topic). If you are attending an extended session, for example B-C, this would replace your choices for both sessions B and C.

KEYNOTES

THURSDAY 6 DECEMBER 2018

LEONIE ANSTEY
EDUCATION CONSULTANT

TEACHERS CREATING IMPACT

What are the skills and tools to develop teaching practices enabling all students to make learning progress? This presentation will focus teacher questioning techniques within learning tasks. You will develop skills and knowledge that will allow the students in your classroom to be clear about what they must learn to make progress and how they can demonstrate how they have learnt it.

Leonie is an educational consultant in instructional leadership and mathematics, and numeracy education. She currently holds a Masters in Mathematics Education, based on research of the skills and knowledge for mathematics teacher coaching. Leonie was a Principal in South Gippsland for six years and has worked as a teacher/principal coach for five years. Leonie's teaching background includes senior secondary (mathematics/physics), primary and she has supported pre-schools to implement challenging learning literacy/numeracy.

In 2010, Leonie was presented with the prestigious Lindsay Thompson Fellowship for her work in raising mathematics achievement for middle years students across a network of schools. The fellowship focussed on instructional leadership at the school, district and country levels in America, Scandinavia and the United Kingdom.

Leonie has presented at national and international conferences on mathematics, leadership and thinking. Topics have included professional learning teams, questioning, curriculum and leadership practices.

ROBYN JORGENSEN
EMERITUS PROFESSOR
UNIVERSITY OF CANBERRA

BRINGING ABOUT SUCCESS IN MATHEMATICS FOR STUDENTS IN THE MARGINS: WHAT MAKES FOR GOOD PRACTICE

Robyn Jorgensen is an Emeritus Professor at the University of Canberra. Previous to this she was a Professor of Education: Equity and Pedagogy. Her work in mathematics education has focused on equity and how practices can either contribute to, or change, the learning outcomes for students who have been traditionally marginalized or excluded from participating in mathematics. She has focused her research on low SES communities, rural/regional communities; and Indigenous communities, most particularly communities located in remote areas. She has recently completed a large national study (ARC-funded) of successful numeracy practices in remote Indigenous communities. She is well known for her work in challenging the status quo in education and seeking to disrupt practices that have been taken-for-granted as 'the' way to teach mathematics. She has been the lead researcher in more that 13 large Australian Research Council Grants; has served on numerous boards and advisory committees; and been the editor of the Mathematics Education Research Journal and served on numerous editorial boards for international and national journals.

LYNN MCCLURE
DIRECTOR
CAMBRIDGE MATHEMATICS

WHAT GOES AROUND DOESN'T ALWAYS HAVE TO COME AROUND...

Whatever year you choose, you can usually find a country that is rethinking the maths curriculum. It may be as part of the regular planned reform which take place every so many years, like Japan. It may be because there is a dissatisfaction with international league table positions, or maybe because the political situation has changed, heralding a different educational philosophy or pedagogy. Designers borrow from countries they see as successful and to a large extent what goes around comes around.

At Cambridge we are trying something different. We are designing a tool which will allow policy makers, designers of curriculum, resources, assessment and PD to benefit from the maths education research that has been done over the past years, to embed the affordances of technology to expose students to ways of working that weren't hitherto possible, and to explore making that content relevant to the 21st Century. Come and see what we're up to!

Sponsored by

CAMBRIDGE UNIVERSITY PRESS

ROB PROFITT-WHITE
PRINCIPAL EDUCATION OFFICER
AUSTRALIAN CURRICULUM: MATHEMATICS

MATHEMATICS CAPABILITY CLUSTERS

When teachers are given time to immerse themselves in the right experiences, and school leaders are able to value, create and sustain the right conditions, then research can make the right impact and transform the way mathematics is taught.

This cost neutral, state department project has evolved by identifying and remediating the problems of practice usually associated with scaling up evidence based professional learning. Endorsements and national awards have further strengthened the regional unity and urgency that investing in teachers is the right thing to do.

'In my 25 years of experience it is rare to find such a large –scale transfer of research knowledge into practice within mathematics education'.
- Professor Merrilyn Goos, 2017.

The project utilises a cluster model that promotes collective efficacy and teacher ownership through bringing together primary and secondary school teachers and leaders. Participants have time to design, try out, validate and plan the implementation of instructional tools and diagnostic cycles. The collaborative leverage from 28 high schools and 44 primary schools, is refining and aligning the right words and actions for highly effective teaching. This extensive network allows collegial reflection of both their own practices and analysis of their own student's thinking.

'Your resources are the most practical and comprehensive set of supports for the Australian Curriculum: Mathematics that I have ever seen. Certainly, this type of support is well in advance of anything in Victoria,' Professor Peter Sullivan, 2017.

Rob has international experience in primary and secondary teaching and is currently a Principal Curriculum Advisor. He is a passionate and creative change maker. Rob has channelled his expertise into one of Queensland's largest initiatives that is making a difference to thousands of students and winning the hearts and minds of teachers.

JAMES RUSSO – MONASH UNIVERSITY

THE CHALLENGES OF TEACHING WITH CHALLENGING TASKS

Teaching with challenging tasks in the early and middle years of primary school can support the development of student reasoning and unleash critical and creative mathematical thinking. However, using such tasks effectively requires the development of a classroom community characterised by reliance and appropriate risk-taking. In this presentation, Russo will present data from his own research describing teacher and student reactions to challenging tasks across two terms of work in Years 1 and 2. Key anticipated audience outcomes from the presentation include:

workshopping several challenging tasks, which F-4 teachers can use with their own students;

- learning that there is more than one way of effectively structuring lessons involving challenging tasks;
- understanding that enabling and extending prompts should be designed with the primary learning objective of the lesson in mind;
- appreciating that lessons involving challenging tasks can be emotionally and intellectually demanding for teachers and students alike, and that classroom management challenges should be anticipated when such tasks are first incorporated into mathematics instruction.

NICOLA YELLAND PROFESSOR OF EARLY CHILDHOOD STUDIES FLINDERS UNIVERSITY

MAKING EARLY MATHEMATICAL EXPLORATIONS COUNT

Young children are naturally curious and want to explore their world in order to make meaning about the experiences, objects and ideas that they encounter. Mathematics and the concepts inherent to it, can provide them with the language and skills to support explorations, document their discoveries, and to communicate and share their findings to an audience. Knowing, and using these skills enables numeracy, and literacy, which then act as the foundation for problem posing, problem solving contexts, and all future investigations, that contribute to satisfying a curious mind. What 'counts' as mathematical knowledge is outlined in the Australian National Curriculum, and in the preschool years the Early Years Learning Framework sets the scene for how young children might embark on such investigations as confident, competent learners.

In this presentation Nicola will highlight some of the ways that early childhood teachers (birth to 8 years of age) can create contexts for learning the mathematical skills and knowledge that we hope will be useful in their lives. She will illustrate the main ideas with examples from research projects in which empirical data from Australian early childhood centres and classrooms and contend that early explorations in authentic contexts are fundamental to understanding mathematical ideas and using them to become fluent and numerate.

DR AMIE ALBRECHT SENIOR LECTURER, MATHEMATICS UNIVERSITY OF SOUTH AUSTRALIA

DEVELOPING MATHEMATICIANS THROUGH PROBLEM SOLVING

Five years ago I designed a course to develop problem-solving skills in pre-service maths teachers at the University of South Australia. We focus on mathematical processes, not any particular branch of mathematics. We learn and practice strategies for: getting started; attacking the problem (e.g., specialising and generalising, being systematic, forming and justifying conjectures); and reflecting on and extending our work. Classes are centred around carefully-chosen puzzles and activities, paired with explicit coaching in mathematical processes, metacognition and collaborative learning. In short, I aim to: develop students' mathematical thinking skills so that they can tackle unfamiliar problems with confidence, help them experience the joy in asking and answering their own questions, and orient them towards the creative ways in which professional mathematicians like myself work.

In this session we'll look at the design and delivery of this course. We'll sample some good problems for uncovering aspects of problem-solving, and talk about specific strategies for progressively developing oral presentation and mathematical writing skills. We'll also tackle the thorny issue of assessment, including how to support students to undertake in-depth mathematical investigations of their own choosing.

My goal is that you'll find one or two specific ideas that will help in your current teaching or, if you have the opportunity, to inspire you to design your own problem-solving course.

ALAN FINKEL AO, CHIEF SCIENTIST OF AUSTRALIA

THE PREREQUISITE FOR PROSPERITY

In the Age of the Algorithm, mastering the foundations in mathematics has never been more important. To grapple with coding, or engineering, or business development or smart design, you can't simply skip ahead: you need the scaffold of mathematics learned in sequence, in school.

Yet mathematics has slipped from a prerequisite for university entry to a footnote in the prospectus, in course after course that depend on fluency in numbers - sending the wrong signal to principals and students.

Too many university students are learning too late the reality that teachers have long understood.

Mathematics is a prerequisite for success. It needs to be a priority in education - from day one.

Australia's Chief Scientist Dr Alan Finkel reiterates the case for a national commitment to the expert teaching of challenging mathematics.

Dr Finkel commenced as eighth Australia's Chief Scientist in January 2016. Prior to this, he was the eighth Chancellor of Monash University and the eighth President of the Australian Academy of Technology and Engineering (ATSE). As Chief Scientist, Dr Finkel has led the Review into the National Electricity Market ('Finkel Review') and the 2016 National Research Infrastructure Roadmap. He leads the STEM Industry Partnership Forum for the COAG Education Council and serves as the Deputy Chair of Innovation and Science Australia.

TOM LOWRIE
CENTENARY PROFESSOR
DIRECTOR OF THE STEM EDUCATION RESEARCH CENTRE, UNIVERSITY OF CANBERRA

STEM-FOCUSED ENGAGEMENT AND IMPACT: CAPACITY BUILDING THROUGH NATION-WIDE AND LOCALISED LEARNING PROGRAMS.

The presentation outlines two professional learning programs that describe teacher impact across national and local programs. The first program, the Early Learning STEM Australia Pilot is a play-based learning program that includes a series of apps to explore STEM learning. The second program is a spatial reasoning intervention program implemented in primary- and secondary-school classrooms.

Both programs included the professional development of teachers however the approaches required differed, with two models of teacher engagement developed. The first model, a national model, for teacher engagement reflected the needs of a large group of teachers across geographically and contextually different areas of Australia. This approach for approximately 300 teachers across 100 preschool sites included delivery of resources, communications and a Community of Practice online as well as limited face-to-face professional development. The second model, a localized model, was able to include more input from classroom teachers in order to develop an intervention program that abreast of local contexts and needs. This model relied more heavily on face-to-face engagement and the reinforcement of established local learning communities.

Teachers will continue to develop understandings on:

Teacher impact in STEM-focused learning

- Building teacher capacity through learning programs
- Different models of professional learning
- Research and professional learning for improving practice

TRACEY MUIR
ASSOCIATION PROFESSOR MATHEMATICS EDUCATION UNIVERSITY OF TASMANIA

LEAVING NOTHING TO CHANCE: ACHIEVING IMPACT THROUGH BEST PRACTICE IN MATHEMATICS EDUCATION

The quality of mathematics education in Australia is recognised internationally yet the impact of this research appears to be limited in terms of its influence and impact on Australian policy and practice. In 2015 I was part of a national research project team who conducted surveys and case studies in 52 Australian schools who were considered 'successful' in terms of improving students' learning outcomes in mathematics. These schools left nothing to chance: they focused on developing mathematical excellence though a consistent approach to students' learning, teachers' skills in teaching mathematics, resources for teaching and teaching and learning mathematics, and a passion and enthusiasm for the enterprise of teaching mathematics. In this keynote, I will discuss the findings from the Best Practice in Mathematics Education project and identify the common characteristics that made these schools successful. I will also share insights from other research projects I have been involved in, including researching flipping the mathematics classroom, and discuss how research based evidence can inform and improve practice, leading to an impact on student outcomes.

As a result of attending this presentation, participants will:

- Gain understanding of what constitutes best practice in mathematics education
- Identify the common characteristics of successful schools that have achieved high gains in student outcomes
- Be informed of the findings from a range of research projects which all have a focus on improving student outcomes
- Be provided with practical examples and suggestions of how they can implement research findings into their own schools and classes

MATT SKOSS
MANAGER OF ENGAGEMENT AAMT

LIFETIME IMPACT: PLAYFULNESS AND CURIOSITY

My observations of early childhood teachers is that they quite naturally foster a strong culture of playfulness and curiosity in their classrooms. Parents expect it - students revel in it - Teachers deliver it!

As a community of teachers, we have to actively work to continue this classroom ethos on into the later years of students' learning. Many barriers exist! With the relentless demands on classroom teachers, we have to work quite hard to 'make space' for ourselves and our students to engage with mathematical ideas that interest us, in a playful and curious way. Despite playfulness and curiosity being the essence of what mathematicians bring to a problem, I contend that 'school and system demands' pose many barriers to teachers and students behaving in a similar way.

Using some interesting problems as a vehicle, this keynote will share some practical classroom and whole-school approaches that can be used to develop a sense of community between ourselves and amongst our students. In time, strategies relevant to your setting will nudge the disposition of your students towards their mathematics learning. As teachers, we hope to have an impact on their learning, drawing on the thinking and approaches that is in the DNA of mathematicians.

Bring your playfulness and curiosity to bear on a problem or two. And before I forget, please bring your 'iThing' to participate in the 'workflow', to have an impact in your classroom.

EDDIE WOO
LEADER, MATHEMATICS GROWTH SCHOOL OPERATIONS AND PERFORMANCE, NSW DEPARTMENT OF EDUCATION

PRINCIPLES OF ENGAGING MATHEMATICS TEACHING

One of the central challenges to effective mathematics learning is that we must cultivate an environment and a view of mathematics that motivates students to undertake the work of learning. In this session, we will explore aspects of mathematics that are often under-emphasised but must be recovered to engage a broad range of students in our beautiful and practical subject.

Eddie is the 2018 Australian Local Hero Award recipient. His enthusiasm for mathematics education is infectious. He feels privileged every day to be working with young people to help them grow and flourish and find their place in the world. Eddie began uploading videos of his maths classes in 2012 to YouTube in an attempt to help a sick child in his class. Eddie now has over 300,000 subscribers.

Checkout his wootube
https://misterwootube.com

Sponsored by

MATHS PATHWAY

GENERAL INFORMATION

CONFERENCE VENUE

La Trobe University, Kingsbury Drive, Bundoora, Victoria.
Closest car park to Union Hall is carpark P3.

CAR PARKING

Car parking at La Trobe University for MAV18 conference is included when you enter your vehicle registration number when registering. If you do not register your car vehicle registration number you will need to **PAY** via the ticket machine on the day.

MORNING TEA

Morning tea will be provided in the exhibition hall on both days.

NETWORKING DRINKS

Date: Thursday 6 December 4:50pm - 5:50pm
Venue: Exhibition, Main Hall, Union Building

Networking drinks is free of charge and open to all registered delegates and exhibitors.

Please indicate whether you will be attending this event when registering online (registration code EE).

CONFERENCE OFFICE CONTACT

Jacqui Diamond – Events Manager
Phone: + 61 3 9380 2399
Mobile: 0422 849 950
Email: jdiamond@mav.vic.edu.au

The Mathematical Association of Victoria
61 Blyth St, Brunswick VIC 3056
Phone: + 61 3 9380 2399
www.mav.vic.edu.au/conference-home.html

CANCELLATION POLICY

Participants who cancel their booking on or prior to Monday 5 November 2018 will receive a refund less a $30 administration fee. All cancellations **must** be in writing and include any documentation already sent out. **No refunds** are available after Monday 5 November 2018. Registration may be transferred to another person.

REGISTRATION INFORMATION

Registration fees

Member Metro: one day	$294
Member Metro: two days	$587
Member Non-Metro: one day	$285
Member Non-Metro: two days	$579
Non Member: one day	$381
Non Member: two days	$762
Student: one day	$156
Student: two days	$313

Happy hour (Thursday 6 December), morning tea and lunch are included in the prices above. All prices include GST.

Before you register you will need:

1. Your username and password to register online, if unsure ring the MAV office on +61 3 9380 2399.

2. School purchase order number or credit card for payment (only Visa and MasterCard are accepted).

3. Contact at school (Business Manager) to approve your registration.

4. List of the sessions you want to attend.

ACCOMMODATION

To register

1. Visit http://registration.mav.vic.edu.au/Reg/

2. Log in using your username (email) and password. If logged in correctly it will display your name.

3. Click on the box that has the MAV18 Conference - choose your sessions, social program, accommodation (if applicable), food, etc, then click confirm.

4. Check the summary and amount you have been charged - if you think you are a member but have been charged as a non-member call the MAV office on 61 3 9380 2399.

5. Click on either purchase order or pay online.

6. If paying by purchase order put in the name, position and email address of a person of authority to sign off on your registration.

7. Click submit to complete your registration.

8. Print out a copy of your confirmation for your records.

9. You'll get an automatic email confirming your registration.

If you do not receive this email within 24 hours your registration has not been completed.

Note: After you have registered you may login at any time using your login details to change your sessions or to re-print your confirmation. You cannot change any item that affects the amount transacted and these changes will have to be made by the MAV office.

Inclusions

The registration fee includes (per person) - parking, morning tea and lunch for each day registered; attendance at selected sessions; networking drinks on Thursday 6 December; and access to industry exhibition.

Notes

- Registrations will not be processed without full payment or a school purchase order number.
- Session numbers are limited and the website will indicate when sessions are full.
- Member rates apply to MAV individual members (including student/preservice teacher membership), institutional/school members, early childhood members, and Associate members . Also to members of interstate mathematics associations that are affiliates of AAMT, and New Zealand Mathematics educators who are member of NZAMT.
- The MAV reserves the right to cancel presentations if minimum numbers are not reached.

This year accommodation at Mantra Hotel and Breakfree Bell City will be available directly with the hotels.

To make bookings please contact the reservations team and mention 'Mathematical Association of Victoria' to receive your discounted rate.

Email: bellcity.res@mantra.com.au
Phone: 03 9485 0380

Bookings available on the below rates between 3 December 2018 – 7 December 2018

MANTRA BELL CITY, PRESTON

Located a short 10-minute drive from La Trobe University, this is a 4-star hotel. A shuttle bus will operate between Mantra and La Trobe University on the Thursday and Friday of the conference. The below prices do not include breakfast.

1 Bed Manhattan: $160 per night room only

2 Bed Manhattan: $220 per night room only

Breakfast may be pre-booked with their reservations for a discounted rate of $25 per person @ Chill Restaurant and Car Parking for a discounted rate of $9 per day.

BREAKFREE BELL CITY, PRESTON

Located next to Mantra, this is a 3-star hotel. A shuttle bus will operate between Breakfree Bell City and La Trobe University on the Thursday and Friday of the conference. The below prices do not include breakfast.

Sleep & Go Queen	$110 per night room only
Sleep & Go Twin	$110 per night room only
Budget Double	$84 per night room only
Budget Single	$69 per night room only

Breakfast may be pre-booked with their reservations for a discounted rate of $20 per person @ Chill Restaurant and Car Parking for a discounted rate of $9 per day.

REGISTRATIONS CLOSE
MONDAY 5 NOVEMBER 2018 AT 5PM

EXHIBITOR PASSPORT

SHUTTLE BUS

During the conference a shuttle will run from Mantra Bell City to La Trobe University. This shuttle service is run by Murrays Coaches.

Departure Point at Mantra – Corner of Hotham Street and Bell Street (in Hotham Street).

Drop off and pick up point at La Trobe University – Bottom of Moat Drive at bus shelter

Thursday 6 December

Departure Mantra Bell City to La Trobe Uni bus shelter, Moat Drive: 7.45am, 8.15am, 8.45am, 9.15am

Departure La Trobe Uni bus shelter, Moat Drive Mantra Bell City: 5pm, 5.45pm, 6.50pm

Friday 7 December

Departure Mantra Bell City to La Trobe Uni bus shelter, Moat Drive: 7.45am 8.15am, 8.45am, 9.15am

Departure La Trobe Uni Bus Shelter to Moat Drive Mantra Bell City: 5pm, 5.45pm

LA TROBE UNIVERSITY

Student Rooms - Glenn College

Bookings for Glenn College will be accepted when registering for MAV18. Glenn College is located on campus at La Trobe University. These are student rooms used during the year so are not spacious. Please note also that there are several other patrons staying at the college at the same time so there may be some noise during your stay. These rooms consist of one single bed with linen. Bathrooms are shared with one bathroom for every four rooms. You will need to bring your own toiletries and soap. The below price does not include breakfast.

Student room: $75 per room/per night

All rooms are subject to availability. We have placed a limited hold on rooms so book early.

NEW THIS YEAR..... PARTICIPATE IN THE EXHIBITOR PASSPORT PROGRAM FOR A CHANCE TO WIN PRIZES!

Each attendee will receive a Passport Program form in their conference satchel. This passport program will also include the location map.

Here's how to enter:

- Visit each exhibitor who is participating in the Passport Program for an engaging conversation or product demonstration.
- Exhibit representative will place a stamp on the Passport Program form.
- If you wish to go in the draw for Thursday prizes, drop your Passport Program off at registration desk before the end of lunch. You will be entered in the Happy Hour draw. If you are attending Friday only, drop your passport program off at registration desk before 1.30pm.
- Drawings will be held on Thursday 6 December (at happy hour) and Friday 7 December (at 2pm) in the Exhibitor Hall.
- **WINNER MUST BE PRESENT TO COLLECT PRIZE!**

Passport Program is open to all MAV18 registered delegates and excludes exhibitors. Only one passport program form per registered attendee will be accepted as a valid entry. All contact information must be completed on the passport form to be eligible for the prize drawing.

LUNCH OPTIONS

Several food outlets at La Trobe University will be serving lunch to conference delegates. You will receive a lunch voucher with confirmation of your registration. This will entitle you to a MAV18 Conference Package Lunch at:

- The Eyrie (Eagle Bar)
- Pings Café Moat
- Bachelor of Coffee
- Café Spice
- Café Veloci
- Caffeine Café
- Charlies Kebabs
- Fuel Juice
- Fusion Pizza
- Grafali's Coffee Roasters
- Grain Express
- Mamak Rice and Noodle
- Nuts-About-Tella
- Vitality
- Writers Bloc

When filling in your registration form online you MUST select which outlet you want to get lunch from for each day you are attending. If nothing has been selected your default will be Ping's Café Moat.

UNION BUILDING

The Eyrie (Eagle Bar)

Thursday
Beef lasagne and salad, soft drink, yoghurt fruit bar.

Friday
Chermoula chicken Maryland and rice, salad (gluten free), soft drink, yoghurt fruit bar.

Pings Café Moat

Thursday
1. Hot lunch box - Lemon chicken or stir fry mixed vegetable with steamed rice, bottle of drink or

2. Cold lunch box - Roast chicken and salad roll, vegetarian sushi, fruit, bottle of drink.

Friday
1. Hot lunch box - Rainbow steak or stir fry mixed vegetable with steamed rice, bottle of drink or

2. Cold lunch box - Teriyaki chicken and salad roll, vegetarian sushi, fruit, bottle of drink.

AGORA SQUARE

Bachelor of Coffee

Chicken schnitzel, cheese and coleslaw ciabatta roll or falafel/salad wrap, drink, sweet treat. Vegetarian, gluten free available.

Café Spice

Large serve of any two curries served with rice from a selection of three meat and three vegetarian curries. Indian sweet dessert (Gulab Jamun) and bottle of drink. Gluten free, nut free, halal, vegan available.

Café Veloci

Main meal with meat or vegetarian options, a piece of fresh fruit, cold drink, chocolate treat. Gluten free, vegetarian, vegan, dairy free, nut free available.

Caffeine Café

One gourmet baguette or gourmet wrap or three pack homemade Vietnamese rice paper rolls or three homemade Sushi or Brown rice salad (Thursday), Quinoa salad (Friday). Regular drink, assorted fresh fruit or melting moment (sweet treat). Vegetarian, vegan, gluten free, dairy free, nut free, lactose free available.

Charlies Kebabs

One small kebab, small chips, bottle of soft drink, piece of fruit. Vegetarian, vegan, gluten free available.

Fuel Juice

Large salad or wholemeal wrap. Regular drink, piece of fresh fruit or small fruit salad, small yoghurt and health bar. Gluten free, vegetarian available.

Fusion Pizza

2 slices of pizza, small chips, (a potato cake and a Hashbrown) or hamburger or two pieces of chicken drumstick or whole Maryland or lasagne. Soft drink, piece of fruit.

Grafali's Coffee Roasters

Any lunch option with a regular sized coffee or water and a piece of fruit. Options include chicken schnitzel, Moroccan chicken, tandoori chicken.

Grain Express

Large meal, can of drink. Vegetarian, gluten free available.

Mamak Rice and Noodle

Rice or noodle dish, can of drink. Vegetarian available.

Nuts-About-Tella

American cheeseburger and fries, small drink, gluten free brownie. Vegetarian, gluten free available.

Vitality

Main roll of your choice, drink, piece of fruit. Vegetarian available.

Writers Block

Boxed sandwich, bottle of water, sweet treat. Vegetarian, vegan, gluten free available.

CAMBRIDGE

Leading the way in maths resources for Victorian schools

Visit our stand at the MAV conference for more information

www.cambridge.edu.au/education

When the wheels are turning, the students are learning.

Texas Instruments

Introducing

TI-Innovator™ Rover

Put maths in motion

Learning becomes a moving experience as students program Rover to explore the maths concepts you teach.

Your ride's here. Roll with Rover, the robotic vehicle that works with TI graphing calculators and the TI-Innovator™ microcontroller.*

education.ti.com/aus/rover

*TI-Innovator™ Rover requires a TI-Innovator™ Hub with TI LaunchPad™ Board and a TI-Nspire™ CX handheld or TI-84 Plus CE graphing calculator. Components are sold separately.

SESSION SUMMARY: THURSDAY

THURSDAY 6 DECEMBER 2018

SESSION A: KEYNOTE, 9AM-10AM

A1	F - Y8	Teachers creating impact *Leonie Anstey*
A2	All levels	Bringing about success in mathematics for students in the margins: what makes for good practice *Robyn Jorgensen*
A3	F - Y9	What goes around doesn't always have to come around... *Lynne McClure*
A4	All levels	Mathematics capability clusters *Rob Proffitt-White*
A5	F - Y4	The challenges of teaching with challenging tasks *James Russo*
A6	Early childhood	Making early mathematical explorations count *Nicola Yelland*

For a full description of keynotes, see page 5.

SESSION B: 11AM-12PM

B1	Y10 - Y12	2017 Math Methods examinations *Allason McNamara, Mary Papp*
B2	F - Y6	Teaching and assessing mathematical proficiency using evidence based practices *Paul Staniscia*
B3	Y4 - Y9	Explore ratio and scales with graphing calculators *Pumadevi Sivasubramaniam, Nurul Shahhida Abu Bakar*
B4	Y5 - Y10	What is mathematics? *Karim Noura*
B5	Y7 - Y12	Mathematics in 'The Greek Anthology' *Terence Mills*
B6	F - Y6	Essential thinking strategies for number facts *John Hein, Michael Ozbun*
B7	F - Y6	Metacognition: reasoning and thinking through problem solving *Marissa Cashmore, Laura Maclean*
B8	F - Y12	Improving students' outcomes through knowing your impact *Alexander Young*
B9	Y5 - Y7	Portions of proportions *Jill Cheeseman, Ann Downton, Carly Sawatzki*
B10	Y7 - Y10	Puzzles, problems and tricks of the trade *Mike Ristovsky*
B11	F - Y6	For the love of Maths 300 *Ellen Corovic, Jennifer Bowden*
B12	Y3 - Y10	Picture puzzles *Doug Williams*
B13	F - Y6	Inquiry based, student centred pedagogies can improve the mathematics learning of all students *Peter Sullivan*
B14	Y7 - Y12	Minimising teacher planning time while improving student outcomes *Bill Murray*
B15	F – Y6	The art of learning through investigation *Leah Smith, Hayden Wardrop*
B16	F - Y2	Number Talks in the early years *Sally Burke*
B17	F - Y6	Utilising codable robotic devices in primary mathematics classrooms *Max Stephens, Duncan Symons*
B18	Y11 - Y12	Investigating complex numbers using series *Ray Williams, Wendy Watts*
B19	F - Y9	Anticipating the Cambridge Maths Framework: making connections *Lynne McClure, Keynote presenter*
B20	Y2 - Y6	Outcomes through games!! *Peggy Ashton*
B21	Y1 - Y6	Strategies to enhance geometry understandings *Richard Korbosky, John Lawton*

SESSION SUMMARY: THURSDAY (cont.)

B22	Y9 - Y12	The mathematics of wind design *Michael O'Connor*
B23	F - Y4	Real, rich and fun- creative open-ended math tasks *Bree Collins, Tim Colman*
B24	Y4 - Y9	Creating critical thinkers *Stephanie Grenfell, Shelley Clancy*
B25	Y3 - Y10	Just right maths! *Yvonne Reilly, Jodie Parsons*
B26	Y4 - Y9	Take a chance on me! *Lewis Gunn, Thi Pham, David Cleary*
B27	Y10 - Y12	Developing UDFs, notes pages and widgets *Chris Ireson, Len Bedier*
B28	Y4 - Y9	How to teach decimals better *Michael O'Reilly, Norrian Rundle*
B29	Y7 - Y10	Are you neglecting the 21st Century? Collaboration, communication, problem solving *Ashley Peacock, Lindsay Hill*
B30	Y4 - Y8	Using assessment for creative and critical learning experiences *Pauline Rogers*
B31	Y4 - Y9	Caring matters *Ray Peck*
B32	Y10 - Y12	A look at networks and decision mathematics *Vicky Kennard*
B33	Y7 - Y10	Digital diagnostic assessment - be smart about planning *Vanessa Rule-Paddle, Antje Leigh-Lancaster*
B34	Y7 - Y8	Learning how to reason in junior secondary - scaffolding mathematical reasoning *Carolyn Smales, Brad Gaylard*
B35	Y7 - Y12	STEM is hiding everywhere *Rodney Anderson*
B36	Y10 - Y12	Design Thinking for VCAL numeracy *Kris Ellery, Leah Whiffin*
B37	Y7 - Y10	Adusu algebra: concrete materials for teaching algebra *Ruth Adusu*
B38	Y7 - Y12	Retrieval practice and concept development using Desmos activities *Bryn Humberstone and Katie White*
B39	Y1 - Y6	Exploring common place value misconceptions in Years 1-6 *Angela Rogers*
B40	F - Y6	Using picture story books in numeracy *Jade Seddon, Jen Briggs*
B41	F - Y3	Big books for marginalised learners: early years *Robyn Jorgensen, Keynote presenter*

SESSION B-C: 11AM-1.20PM

B-C1	Y10 - Y12	VCE Mathematical Methods - use TI-Nspire as a teaching tool *Sanjeev Meston*
B-C2	Y10 - Y12	Algorithmic and computational thinking using R Software *Nazim Khan*
B-C3	Y10 - Y12	Limited by our own imagination! *Craig Browne*
B-C4	F - Y2	Spatial reasoning: a curriculum for early childhood mathematics education *Rachel Pollitt*
B-C5	F - Y10	Using formative assessment to plan differentiated instruction in mathematics *Lindsay Wehrwein, Andrew Cordell, Natalie Edwards*
B-C6	Y7 - Y10	Addressing individualisation of teaching using technology: re Gonski recommendations *Robert Rook*
B-C7	F - Y10	Birth to Level 10 mathematics teaching toolkit *Victoria Hall, Angela Scuderi, Marina Zhang*
B-C8	F - Y10	'Leadership content knowledge': what do leaders need to know *Nadia Walker*
B-C9	Y7 - Y10	Enrichment tasks for high performing students *Donna Callow, Jim Rizos*
B-C10	Y11 - Y12	Creating impact with your TI-Nspire in Mathematical Methods *Frank Moya*

SESSION C: 12.10PM-1.10PM

C1	Y10 - Y12	2017 Specialist Mathematics Examinations *Allason McNamara, Philip Swedosh, Dean Lamson*
C2	F - Y6	Moving towards more open and challenging tasks *Michael Bairstow*
C3	Y11 - Y12	Teaching strategies for Further Maths *Celeste Pryke*
C4	Y5 - Y8	Quick is the aim, smart is the gain *Helen Barker, Anne Parnell, Troy Lowe*
C5	F - Y6	Reasoning: the forgotten proficiency *Michael Nelson*
C6	F - Y8	Problem solving in primary mathematics *John West*
C7	F - Y12	Creating impact with Wolfram|Alpha *Craig Bauling*
C8	F - Y2	Hands-on maths for Prep - Year 2 *Anna Kapnoullas*
C9	Y5 - Y10	Stripping out the detail *Vicky Kennard*
C10	Y4 - Y10	What's the rush? Using reflection to promote self-regulation *Karen McMullen*
C11	Y6 - Y9	Jumping frogs game, algebra, graphing ... yes!!! *Ian Bull*
C12	Y7 - Y12	Problems worth exploring episode 2 *Peter Fox*
C13	Y4 - Y9	Factors, composites and primes - what's the problem? *Dianne Siemon*
C14	F - Y6	How long is a 30 centimetre ruler? *Cassandra Lowry*
C15	Y5 - Y12	Using teamwork to motivate students in the classroom *Joseph Wright*
C16	Y4 - Y9	Education Perfect: improve learning outcomes in maths *Clare Feeney*
C17	F - Y6	Utilising codable robotic devices in primary mathematics classrooms *Max Stephens, Duncan Symons*
C18	Y7 - Y12	Graphics calculator programming for dummies *Tim Grabovszky*
C19	Y10 - Y12	Algorithms for partial fractions *Steve Hu*
C20	Y11 - Y12	A binomial probability bonanza! *Russell Brown, James Mott*
C21	Y5 - Y10	Reciprocal teaching in mathematics *Thao Huynh, Alex Mills*
C22	Y8 - Y11	GeoGebra in the classroom - building conceptual understanding *Danijela Draskovic*
C23	Y3 - Y8	Fractionally more interesting than pizzas and pies *Helen Booth*
C24	Y5 - Y10	What's fair about the fair? *Thomas Moore, Daniel Bunworth, Mark Gleeson*
C25	Y7 - Y10	Maths is allowed to make sense *Peter Collins*
C26	Y4 - Y9	Are you struggling to engage middle school students in the maths classroom? *Adam Kruger, Scott Rumble*
C27	F - Y8	Mathematics achievement by Indigenous children: LSIC and PAT maths *Jim Spithill, Fiona Skelton*
C28	Y3 - Y10	HITS for improving student outcomes *Michelle de Boer, Simone Hargrave*
C29	Y7 - Y10	Mathematician Monday: the story behind the numbers *Ryan Martini*
C30	Y3 - Y8	Visual strategies for fractions, decimals and percentages *Christine Lenghaus*
C31	F - Y6	Creating assessment to inform your teaching *Catherine Epstein, Samantha Fleming*
C32	Y10 - Y12	Design thinking for VCAL numeracy *Kris Ellery, Leah Whiffin*

SESSION SUMMARY: THURSDAY (cont.)

C33	Y8 - Y12	Digital resources in action *Ro Bairstow*
C34	F - Y9	How to do intervention well *Tierney Kennedy*
C35	F - Y6	Modelling maths learning through team teaching *Rebecca Stewart, Caitlin Faiman*
C36	Y4 - Y9	Algorithmic thinking and coding in the middle school *Rose Humberstone, Christian Neeson*
C37	Y7 - Y12	Essential Maths, Cambridge Senior Maths and ICE-EM – A guide to Cambridge's online resources powered by HOTmaths *VJ Gunawardana*
C38	Y3 - Y6	Innovation and inspiration: use of instructional videos to promote mathematics *Fiona Clarke*
C39	F - Y6	A matter of time *Margaret Thomas, Phil Clarkson*
C40	Y10 - Y12	Worthwhile CAS calculator use in this year's second Methods exam *Kevin McMenamin*
C41	Y5 - Y10	4 arm shapes and other visual algebra experiences *Doug Williams*
C42	Y4 - Y9	Process over product: it's more than an equation *Lorraine Day, Derek Hurrell*
C43	Y3 - Y9	Boring, pointless and scary! *Andrew Lorimer-Derham, Michael Briggs-Miller*

SESSION D: 2.30PM-3.30PM

D1	Y2 - Y7	Painless partitioning: developing proficiencies through games *David Dunstan, Paul Swan*
D2	Y3 - Y10	Engaging students in Footy Maths *Richard Korbosky*
D3	F - Y3	Challenging tasks: inspiring ideas for transforming the early years classroom *Johnson Alagappan, Sharyn Livy*
D4	Y10 - Y12	Maths Method adding value through team approach *James Poon, Jimmy Drossos, Sabine Partington, Tom Christiansen*
D5	VCE	3D graphing and solids of revolution *Sanjeev Meston*
D6	Y5 - Y8	Here comes the sun *Tim Byrne*
D7	Y11 - Y12	Preparing for Methods examinations – a video highlights package *Alastair Lupton*
D8	Y10 - Y12	ClassPad tips and tricks *Charlie Watson*
D9	F - Y2	Hands-on maths for Prep - Year 2 *Anna Kapnoullas*
D10	F - Y9	Raising challenge through questioning *Leonie Anstey, Keynote presenter*
D11	F - Y9	Where do you get your ideas??? *Jacinta Blencowe*
D12	Y5 - Y10	Google forms - real time data to guide teaching *Shelley Pendlebury, Cassandra Zara*
D13	Y7 - Y12	VCE Algorithmics HESS - introducing algorithmic thinking to students *Georgia Gouros*
D14	Y11 - Y12	Measuring a dampening effect, trigonometry meets the exponential *Anthony Harradine*
D15	F - Y6	Numeracy learning specialists: building excellence in teaching and learning *Russell McCartney, Chris Terlich*

D16	Y7 - Y10	STEAM powered revolution or smoke and mirrors? *Peter Fox*
D17	F - Y12, VCAL	MAV students activities – enhancing problem solving and inquiry *Helen Haralambous, Jennifer Bowden*
D18	Y9 - Y11	In search of the Euler Line *Shane Dempsey, Raymond Rozen*
D19	F - Y9	(PBL + STEM) x space + games = fun *Roxanne Levett, Natalie Schilov*
D20	F - Y6	Increasing student achievement by enhancing teacher confidence: research and practice *Ellen Corovic*
D21	Y7 - Y11	Being the third donkey *Linda Shardlow*
D22	Y4 - Y9	It's hailing numbers *Katherine Seaton*
D23	Y11 - Y12	Algebra and geometry of complex numbers using TI-Nspire *James Mott, Russell Brown*
D24	Y4 - Y12	Active geometry learning in secondary school classrooms using MATHOMAT V2 *John Lawton*
D25	Y11 - Y12	Capturing the spirit of a Year 12 Methods investigation *Mark Oudshoorn, Zoë Carolan*
D26	Y4 - Y9	Problem solving: what did you learn? *Pumadevi Sivasubramaniam*
D27	Y10 - Y12	Fun and games in VCE maths *Rosalind Willsher, Sharon Darling*
D28	Y6 - Y10	Teaching with Algebra Tiles *Michael O'Reilly, Norrian Rundle*
D29	F - Y10	Essential Assessment – Victorian Curriculum assessment and curriculum made easy *Andrew Spitty*
D30	Y4 - Y12	Demystifying surds - an alternative approach! *Greg Sheridan*
D31	Y7 - Y10	Activities for exploring maths concepts *Vanessa Rule-Paddle, Julian Lumb*
D32	Y8 - Y12	Digital resources in action *Ro Bairstow*
D33	F - Y6	Developing classroom norms to enhance student mathematical reasoning *Wanty Widjaja, Jennifer Churcher*
D34	Y7 - Y10	Rich task workshop *Stacy Thomas*
D35	Y5 - Y10	Virtual reality - making all maths imaginary *Thomas Moore, Tony Vallance*
D36	Y12	VCE Maths Methods - making your application task engaging *Trevor Carter, Ian Wong*
D37	Y9 - Y11	Transition from fully differentiated to VCE *Jenny Sutton*
D38	Y10 - Y12	Developing Further Mathematics SAC tasks *Kevin McMenamin*
D39	Y7 - Y12	HITing up the maths classroom: improving student outcomes with HITS *Geetha Rangarajan, David Chew*
D40	Y5 - Y8	Using problem solving to create differentiated learning experiences *Pauline Kohlhoff, Anne Prescott*
D41	F - Y2	Working mathematically with infants *Doug Williams*
D42	Y7 - Y12	Making 'we just don't know' accessible and beautiful *Andrew Crisp*
D43	F - Y12	Mathematica case-study, Year 9 Melbourne Girls Grammar *Ian Willson, Faina Brichko*

SESSION D-E: 2.30PM-4.40PM

D-E1	Y9 - Y12	Inspiring Further Math students: recursion and financial maths *Craig Bauling*
D-E2	Y10 - Y12	Real-world data analysis using Google sheets *Nazim Khan*
D-E3	Y7 - Y10	Enrichment tasks for high performing students *Donna Callow, Jim Rizos*

SESSION SUMMARY: THURSDAY (cont.)

SESSION E: 3.40PM-4.40PM

E1	Y4 - Y9	Bring industry and student interest to maths *Felicity Furey, Adam Kruger*
E2	Y7 - Y12	A critical analysis of the use of effect sizes to judge impact *George Lilley, Marcel Van Otterdyk*
E3	Y7 - Y10	Maths, magic and more *Stephen Hanlon*
E4	Y2 - Y6	Mathematical games to promote the proficiencies *Catherine Attard*
E5	Y10 - Y12	Turbocharge your ClassPad *Charlie Watson*
E6	Y1 - Y6	Flexible numeracy learning in the primary setting *Michael Gerber, Janis Mesiti, Craig Wiese*
E7	Y7 - Y12	Minimising teacher planning time while improving student outcomes *Bill Murray*
E8	Y6 - Y9	Jumping frogs game, algebra, graphing ... yes!!! *Ian Bull*
E9	F - Y6	Learning place value through the lens of pattern *Kristie Gibson, Melissa Sokol*
E10	Y12	UDFs and widgets in VCE Specialist Mathematics *Chris Ireson*
E11	Y7 - Y9	Teach Excel-ent maths *Robert Money, John Widmer*
E12	F - Y4	Taking a look at formative assessment practices in primary school mathematics *Alex Box, Sam Collier*
E13	Y9 - Y11	In search of the Euler Line *Shane Dempsey, Raymond Rozen*
E14	F - Y9	(PBL + STEM) x space + games = fun *Roxanne Levett, Natalie Schilov*
E15	Y4 - Y9	Acquiring the habit of digital innovation *Daisy O'Bryan*
E16	Y7 - Y10	Flipped learning in middle school maths *Andrew McAlindon, Clara Cremona Millo*
E17	Y1 - Y7	Creating an impact: sequence of challenging tasks *Sharyn Livy, Ann Downton*
E18	Y7 - Y10	Creative and critical thinking at Camberwell High School *Geoffrey Menon, Ursula Parker*
E19	F - Y6	Creating challenging problem solving tasks for all students *Michael Minas*
E20	Y2 - Y6	Outcomes through games!! *Peggy Ashton*
E21	Y9 - Y11	Creating impact by crashing robot cars - simultaneous rquations *Brian Lannen*
E22	Y7 - Y10	reSolve: maths by inquiry engaging classroom resources *Helen Haralambous*
E23	Y7 - Y12	Create an impact: classroom presentations and flipped videos *Dietmar Schaffner*
E24	PRESENTER HAS CANCELLED WORKSHOP	
E25	Y4 - Y8	Creating impact on learning fractions and decimals *Anna Bock*
E26	F - Y9	Using reSolve (maths by inquiry) in the classroom *Andrew Noordhoff, Jared Meredith*
E27	Y5 - Y10	Topic starters *Mike Clapper*
E28	F - Y6	Transforming numeracy outcomes through effective multi sensory CRA methodologies *Esther White*
E29	Y3 - Y10	HITS for improving student outcomes *Michelle de Boer, Simone Hargrave*
E30	Y4 - Y12, Tertiary	Creating individualised online homework *Thomas Wong, Jennifer Palisse*
E31	F - Y6	Archimedes: the maths entertainer *Patrick Collins*

E32	F - Y6	What order should I teach topics in? *Tierney Kennedy*
E33	Y7 - Y10	Adusu Algebra: concrete materials for teaching algebra *Ruth Adusu*
E34	Y4 - Y9	Creating student buy-in for growth mindsets *Megan Steel*
E35	Y7 - Y10	Using data science to change the world *Dianne Frost, Linda McIver*
E36	Y7 - Y12	Making the connection: teaching big ideas and metacognition for examinations *Patricia Hosking*
E37	F - Y6	Engaging primary school students in mathematics through coding and robotics *Jodie Miller, Kevin Larkin*
E38	Y7 - Y12	Essential Maths, Cambridge Senior Maths and ICE-EM – a guide to Cambridge's online resources powered by HOTmaths *VJ Gunawardana*
E39	Y8 - Y12	Implementing evidence-informed feedback processes in mathematics to improve students' learning *Tanya Vaughan, Ollie Lovell*
E40	F - Y6	Hands on pattern and algebra *Catherine Epstein, Mandi Mackey*
E41	Y3 - Y7	Engineering 'aha' moments in number *Doug Williams*
E42	Y3 - Y12	From print to digital: our free maths textbook *Andrew Crisp*
E43	Y4 - Y9	Factors, composites and primes - what's the problem? *Dianne Siemon*
E44	Y7 - Y12	Technology: classroom asset or distraction? *Daniel Smorgon*

SESSION SUMMARY: FRIDAY

FRIDAY 7 DECEMBER 2018

SESSION F: KEYNOTE, 9AM-10AM

F1	All Levels	Developing mathematicians through problem solving *Amie Albrecht*
F2	All Levels	The prerequisite for prosperity *Alan Finkel*
F3	All Levels	STEM-focused engagement and impact: capacity building through nation-wide and localised learning programs Tom Lowrie
F4	F - Y6	Leaving nothing to chance: achieving impact through best practice in mathematics education *Tracey Muir*
F5	F - Y10	Lifetime impact: playfulness and curiosity *Matt Skoss*
F6	Y6 - Y12	Principles of engaging mathematics teaching *Eddie Woo*

For a full description of keynotes, see page 5.

SESSION G: 11AM-12PM

G1	Y4 - Y7	Differentiating explorations with manipulatives and technology *Amy Somers, Leonie Haggett*
G2	Y4 - Y9	Cross-curricular middle school mathematics *Jennifer Kain, Andrea Demosthenous*
G3	Y7 - Y12	Autonomous vehicles - driving mathematical thinking *Peter Fox*
G4	Y1 - Y10	Maths card games that make you 'think' *Richard Korbosky*
G5	Y7 - Y12	Mathematics in 'The Greek Anthology' *Terence Mills*
G6	Y7 - Y12	Using Education Perfect to inform your students and your teaching to improve learning in maths *Kelly Hollis*
G7	F - Y6	*Essential thinking strategies for number facts* *John Hein, Michael Ozbun*
G8	F - Y6	The mathematical opportunities are endless... *Tracey Muir, Keynote presenter*
G9	F - Y12	Improving students' outcomes through knowing your impact *Alexander Young*
G10	Early years	Sabah children learn mathematics through games before school *Brian Doig, Connie Ompok*
G11	Y7 - Y12	Mathematical playfulness *Eddie Woo, Keynote presenter*
G12	F - Y6	Challenge, persist and share *Stacey Lamb*
G13	Y7 - Y10	The art of enrichment *Narcisa Corcaci*
G14	Y5 - Y10	Stripping out the detail *Vicky Kennard*
G15	F - Y6	Why play mathematical games in primary mathematics? *James Russo, Toby Russo*
G16	Y2 - Y12	Taking tricubes to the limit *Doug Williams*
G17	Y9 - Y12	Introduction to programming using TI-Nspire *Raymond Rozen, Shane Dempsey*
G18	Y11 - Y12	Investigating complex numbers using series *Ray Williams, Wendy Watts*
G19	Y4 - Y9	Developing and assessing and algebraic thinking *Max Stephens, Cath Pearn*
G20	Y3 - Y8	Folk folk to funk: the mathematics of dance *Jennifer Bowden, Michaela Epstein*
G21	Y6 - Y12	Design Thinking in maths classes *Jan Mann, Ming Gao, Heather Boschert*

G22	F - Y9	Anticipating the Cambridge Maths Framework: making connections *Lynne McClure, Keynote presenter*
G23	Y4 - Y9	Why we need critical and creative thinking: an industry perspective *Felicity Furey*
G24	F - Y6	Leading a changing maths culture *Amy Backas*
G25	F - Y9	Warm ups and engaging classroom activities *Nadia Abdelal*
G26	Y9 - Y12	The mathematics of wind design *Michael O'Connor*
G27	Y5 - Y10	Reciprocal teaching in mathematics *Thao Huynh, Alex Mills*
G28	F - Y3	Challenging tasks: inspiring ideas for transforming the early years classroom *Johnson Alagappan, Sharyn Livy*
G29	Y3 - Y8	Fractionally more interesting than pizzas and pies *Helen Booth*
G30	Y7 - Y10	Developing deep mathematical understandings in STEM contexts *Jim Lowe*
G31	Y7 - Y9	Computational thinking: going beyond the text book *Sanjin Dedic, Meg Pini*
G32	Y10 - Y12	Why is 'showing your work' so important? *Dietmar Schaffner, Maria Schaffner*
G33	Y3 - Y9	Boring, pointless and scary! Andrew Lorimer-Derham, Michael Briggs-Miller
G34	F - Y6	Promoting problem solving and critical thinking using iPads *Sara McKee, Melissa Lake*
G35	Y10 - Y12	Developing UDFs, notes pages and widgets *Chris Ireson, Len Bedier*
G36	Y7 - Y11	Inquiry based, student centred pedagogies can improve the mathematics learning of all students *Peter Sullivan*
G37	F - Y12	Numbers and nerds: exploring maths in the media *Jennifer Hall, Michael Minas*
G38	F - Y6	Teaching coding without technology? Yes I can! *Samantha Bothe*
G39	Y5 - Y10	So the answer is an integer? *Mike Clapper*
G40	Y5 - Y10	Virtual reality - making all maths imaginary Thomas Moore, Tony Vallance

SESSION G-H: 11AM-1.20PM

G-H1	Y9 - Y12	Using LaTeX to produce professional mathematical documents *Neil Holden*
G-H2	Y10 - Y12	Limited by our own imagination! *Craig Browne*
G-H3	F - Y10	Using formative assessment to plan differentiated instruction in mathematics *Lindsay Wehrwein, Andrew Cordell, Natalie Edwards*
G-H4	Y7 - Y12	Informatics: challenging, inspirational and relevant coding *Jan Honnens*
G-H5	Y10 - Y12	Using computers in a maths classroom with Year 11/12+ students *Robert Rook*
G-H6	F - Y10	Birth to Level 10 mathematics teaching toolkit *Victoria Hall, Angela Scuderi, Marina Zhang*
G-H7	F - Y10	'Leadership content knowledge': what do leaders need to know? *Nadia Walker*
G-H8	Y10 - Y12	Algorithmic and computational thinking using R software *Nazim Khan*

SESSION SUMMARY: FRIDAY (cont.)

SESSION H: 12.10PM-1.10PM

H1	Y10 - Y12	Writing instructional material for mathematics *Neale Woods*
H2	Y4 - Y9	Quick is the aim, smart is the gain *Helen Barker, Anne Parnell, Troy Lowe*
H3	Y7 - Y10	Maths, magic and more *Stephen Hanlon*
H4	Y10 - Y12	Maths Method adding value through team approach *James Poon, Jimmy Drossos, Sabine Partington, Tom Christiansen*
H5	F - Y6	Reasoning: the forgotten proficiency *Michael Nelson*
H6	F - Y12	Creating impact with Wolfram|Alpha *Craig Bauling*
H7	Y11 - Y12	Preparing for Methods Examinations – a video highlights package *Alastair Lupton*
H8	Early years	Sabah children learn mathematics through games before school *Brian Doig, Connie Ompok*
H9	Y10 - Y12	Turbocharge your ClassPad *Charlie Watson*
H10	F - Y6	For the love of Maths 300 *Ellen Corovic, Jennifer Bowden*
H11	F - Y12	Superannuation - ignorance may be bliss, but also expensive *Rob Vermay*
H12	F - Y9	Raising challenge through questioning *Leonie Anstey, Keynote presenter*
H13	F - Y9	Where do you get your ideas??? *Jacinta Blencowe*
H14	Y7 - Y12	VCE Algorithmics HESS - introducing algorithmic thinking to students *Georgia Gouros*
H15	Y4 - Y10	What's the rush? Using reflection to promote self-regulation *Karen McMullen*
H16	Y10 - Y12	Exploring sequences - what can they tell us? *Brett Stephenson*
H17	Y8 - Y12	An interactive statistical sampling activity with chocolate *Anthony Morphett, Jennifer Palisse*
H18	Y10 - Y12	Encouraging independent learning by increasing literacy in VCE Further Mathematics *Rod Williams, Deb Murrell*
H19	Y6 - Y12	Design Thinking in maths classes *Jan Mann, Ming Gao, Heather Boschert*
H20	Y11 - Y12	Measuring a dampening effect, trigonometry meets the exponential *Anthony Harradine*
H21	Y4 - Y9	It's hailing numbers *Katherine Seaton*
H22	Y11 - Y12	Capturing the spirit of a Year 12 Methods investigation *Mark Oudshoorn, Zoë Carolan*
H23	Y3 - Y10	Just right maths! *Yvonne Reilly, Jodie Parsons*
H24	F - Y6	Launch explore summarise - engaging open tasks *Brendan Hodge, Chris Terlich*
H25	Y8 - Y11	GeoGebra in the classroom - building conceptual understanding *Danijela Draskovic*
H26	F - Y10	Essential Assessment – Victorian Curriculum assessment and curriculum made easy *Andrew Spitty*
H27	Y4 - Y12	Demystifying surds - an alternative approach! *Greg Sheridan*
H28	Y4 - Y8	Using assessment for creative and critical learning experiences *Pauline Rogers*
H29	Y10 - Y12	A look at networks and decision mathematics *Vicky Kennard*
H30	Y7 - Y10	Digital diagnostic assessment - be smart about planning *Vanessa Rule-Paddle*
H31	F - Y6	Transforming numeracy outcomes through effective multi sensory CRA methodologies *Esther White*

H32	Y7 - Y12	Working like a mathematician: structuring a classroom experience *Matt Skoss, Keynote presenter*
H33	Y6 - Y10	Fractals and chaos theory in the classroom *Richard Marks, Jacob Pini, Sanjin Dedic*
H34	Y5 - Y12	Data to differentiate: Using Mathspace in your classroom *Tamara Heaney*
H35	F - Y9	How to do intervention well *Tierney Kennedy*
H36	F - Y6	Curriculum created by Kids - CCK (AKA MTQ) Mark Gleeson, Eadaoin Lorigan
H37	F - Y6	Imagery: Using images to develop rich tasks in mathematics *Fiona Clarke*
H38	F - Y6	Assessing mathematical reasoning *Jenny McDonell*
H39	Y5 - Y9	Using games to engage students in maths *Helen Haralambous*
H40	F - Y6	A matter of time *Margaret Thomas, Phil Clarkson*
H41	F - Y12	Fascinating, captivating and absorbing learners *Doug Williams*

SESSION I: 2.30PM-3.30PM

I1	Y7 - Y9	Delivering excellence in financial literacy *Damian Nicholson*
I2	Y10 - Y11	Stuck in old loci again *Neale Woods*
I3	Y7 - Y12	Using Education Perfect to inform your students and your teaching to improve learning in maths *Kelly Hollis*
I4	F - Y7	Metacognition: reasoning and thinking through problem solving *Marissa Cashmore, Laura Maclean*
I5	F - Y8	Problem solving in primary mathematics *John West*
I6	Y2 - Y8	Learning fractions with Picture Puzzles *Doug Williams*
I7	F - Y12	Superannuation - ignorance may be bliss, but also expensive *Rob Vermay*
I8	F - Y6	Continuous and sustained learning for teachers in your school *Lee-Anne Pyke*
I9	Y10 - Y12	Encouraging independent learning by increasing literacy in VCE Further Mathematics *Rod Williams, Deb Murrell*
I10	Y12	UDFs and widgets in VCE Specialist Mathematics *Chris Ireson*
I11	Y5 - Y12	Using teamwork to motivate students in the classroom *Joseph Wright*
I12	Y7 - Y9	Teach Excel-ent maths *Robert Money, John Widmer*
I13	F - Y4	Taking a look at formative assessment practices in primary school mathematics *Alex Box, Sam Collier*
I14	F - Y12	Strengthening the maths teacher blogging community in Australia *Oliver Lovell, Michaela Epstein*
I15	Y7 - Y10	Creative and critical thinking at Camberwell High School *Geoffrey Menon, Ursula Parker*
I16	Y4 - Y9	Developing and assessing and algebraic thinking *Max Stephens, Cath Pearn*
I17	Y10 - Y12	Flipping the maths classroom for EAL learners *Bernadette Mercieca*
I18	Y7 - Y9	Arithmagons with Scratch programming *Sanjin Dedic, Meg Pini*
I19	Y5 - Y9, VCAL	My students don't know their tables! *Michael O'Reilly, Norrian Rundle*

SESSION SUMMARY: FRIDAY (cont.)

I20	F - Y12	Numbers and nerds: exploring maths in the media *Jennifer Hall, Michael Minas*
I21	Y7 - Y12	Making 'we just don't know' accessible and beautiful *Andrew Crisp*
I22	Y5 - Y10	Topic starters *Mike Clapper*
I23	Y7 - Y10	Activities for exploring maths concepts *Vanessa Rule-Paddle, Julian Lumb*
I24	F - Y6	What order should I teach topics in? *Tierney Kennedy*
I25	F - Y12	Panel discussion: can technology improve student learning outcomes? *Craig Blake, Andrew Musgrave, Kylie Armstrong*
I26	Y9 - Y11	Transition from fully differentiated to VCE *Jenny Sutton*
I27	Y5 - Y8	Using problem solving to create differentiated learning experiences *Pauline Kohlhoff, Anne Prescott*
I28	Y7 - Y12	HITing up the maths classroom: improving student outcomes with HITS *Geetha Rangarajan, David Chew*
I29	Y10 - Y12	Worthwhile CAS calculator use in this year's second Methods exam *Kevin McMenamin*
I30	Y4 - Y9	Mathematica case-study, Year 9 Melbourne Girls Grammar *Ian Willson, Faina Brichko*
I31	F - Y6	Leading a changing maths culture *Amy Backas*
I32	F - Y6	Challenge, persist and share *Stacey Lamb*

SESSION I-J: 2.30PM-4.40PM

I-J1	Y9 - Y12	Inspiring Further Math students: recursion and financial maths *Craig Bauling*
I-J2	Y7 - Y12	Informatics: challenging, inspirational and relevant coding *Jan Honnens*
I-J3	Y10 - Y12	Real-world data analysis using Google Sheets *Nazim Khan*

SESSION J: 3.40PM-4.40PM

J1	Y10 - Y12	Further Maths exams: using the CAS calculator efficiently and effectively *Kevin McMenamin*
J2	THIS SESSION IS AT H2	
J3	F - Y12	Mathematica basics: get started! *Ian Willson*
J4	Y2 - Y10	Get your hands on hand-on tasks *Doug Williams*
J5	Y4 - Y9	Creating critical thinkers *Stephanie Grenfell, Shelley Clancy*
J6	Y11 - Y12	Teaching strategies for Further Maths *Celeste Pryke*
J7	Y8 - Y12	An interactive statistical sampling activity with chocolate *Anthony Morphett, Jennifer Palisse*
J8	Y3 - Y12	From print to digital: our free maths textbook *Andrew Crisp*
J9	Y7 - Y10	Embedding Maths 300 resources in secondary maths programs *Helen Haralambous, Danijela Draskovic*
J10	F - Y1	Increasing exploration and number in Prep *Michael Bairstow, Sarah Campbell*
J11	Y7 - Y10	STEM resources from reSolve: maths by inquiry *Kaye Stacey, Lucy Bates*
J12	F - Y9	Learning goals *Laura Boylan, Kate Lachmund*

J13	Y4 - Y9	Engaging in geometry - critical for STEM *Marj Horne*
J14	Y6 - Y10	Who estimates 6cm the best, when under pressure? *Anthony Harradine*
J15	F - Y6	Let's get started! Using games to promote fluency and reasoning *Jade Seddon, Jen Briggs*
J16	Y5 - Y7	Modelling motion: putting mathematics into middle years STEM activities *Susie Groves, Brian Doig*
J17	Y2 - Y6	Algorithmic thinking across primary years *Jennifer Bowden, Judy Gregg*
J18	F - Y2	The use of non-examples to promote critical thinking in the early years *Kate Copping*
J19	F - Y6	Creating challenging problem solving tasks for all students *Michael Minas*
J20	Y7 - Y12	Technology: classroom asset or distraction? *Daniel Smorgon*
J21	Y5 - Y12	Data to differentiate: using Mathspace in your classroom *Tamara Heaney*
J22	Y1 - Y6	Flexible numeracy learning in the primary setting *Michael Gerber, Janis Mesiti, Craig Wiese*
J23	Y10 - Y12	Fun and games in VCE maths *Rosalind Willsher, Sharon Darling*
J24	F - Y6	Beyond just content: using the maths proficiencies to develop skills for the future *Cassandra Lowry*
J25	Y4 - Y9	Take a chance on me! *Lewis Gunn, Thi Pham, David Cleary*
J26	Y5 - Y10	What is mathematics? *Karim Noura*
J27	Y7 - Y8	Learning how to reason in junior secondary - scaffolding mathematical reasoning *Carolyn Smales, Brad Gaylard*
J28	Y10 - Y12	Algorithms for partial fractions *Steve Hu*
J29	Y7 - Y10	Mathematician Monday: the story behind the numbers *Ryan Martini*
J30	Y3 - Y8	Visual strategies for fractions, decimals and percentages *Christine Lenghaus*
J31	Y7 - Y12	A critical analysis of the use of effect sizes to judge impact *George Lilley, Marcel Van Otterdyk*

MAVSHOP

HTTP://SHOP.MAV.VIC.EDU.AU

MAV MEMBERS RECEIVE A 20% DISCOUNT ON ALL STOCK

MAVSHOP IS BACK AT THE CONFERENCE AGAIN THIS YEAR!

Visit us for the latest and greatest resources for maths educators including:

- books for professional learning
- hands-on resources
- maths badges
- classroom resources and activities
- assessment support

Bring your purchase order, cash or credit card to purchase the latest resources, and avoid postage on your order. **Heaps of new products available in 2018!**

THE MATHEMATICAL ASSOCIATION OF VICTORIA

TO ORDER
HTTP://SHOP.MAV.VIC.EDU.AU
OR CALL +61 3 9380 2399

Prices are subject to change.

SESSION DETAILS

THURSDAY
6 DECEMBER

SESSION A, Keynote, Thursday, 9am-10am

A1 Teachers creating impact

F - Y8, Keynote, Lecture
Leonie Anstey, Education consultant

What are the skills and tools to develop teaching practices enabling all students to make learning progress? This presentation will focus teacher questioning techniques within learning tasks. You will develop skills and knowledge that will allow the students in your classroom to be clear about what they must learn to make progress and how they can demonstrate how they have learnt it.

Leonie is an educational consultant in instructional leadership and mathematics, and numeracy education. She currently holds a Masters in Mathematics Education, based on research of the skills and knowledge for mathematics teacher coaching. Leonie was a Principal in South Gippsland for six years and has worked as a teacher/principal coach for five years. Leonie's teaching background includes senior secondary (mathematics/physics), primary and she has supported pre-schools to implement challenging learning literacy/numeracy.

In 2010, Leonie was presented with the prestigious Lindsay Thompson Fellowship for her work in raising mathematics achievement for middle years students across a network of schools. The fellowship focussed on instructional leadership at the school, district and country levels in America, Scandinavia and the United Kingdom.

Leonie has presented at national and international conferences on mathematics, leadership and thinking. Topics have included professional learning teams, questioning, curriculum and leadership practices.

A2 Bringing about success in mathematics for students in the margins: what makes for good practice

All levels, Keynote, Lecture
Robyn Jorgensen, University of Canberra

Robyn Jorgensen is an Emeritus Professor at the University of Canberra. Previous to this she was a Professor of Education: Equity and Pedagogy. Her work in mathematics education has focused on equity and how practices can either contribute to, or change, the learning outcomes for students who have been traditionally marginalized or excluded from participating in mathematics. She has focused her research on low SES communities, rural/regional communities; and Indigenous communities, most particularly communities located in remote areas. She has recently completed a large national study (ARC-funded) of successful numeracy practices in remote Indigenous communities. She is well known for her work in challenging the status quo in education and seeking to disrupt practices that have been taken-for-granted as 'the' way to teach mathematics. She has been the lead researcher in more than 13 large Australian Research Council Grants; has served on numerous boards and advisory committees; and been the editor of the Mathematics Education Research Journal and served on numerous editorial boards for international and national journals.

A3 What goes around doesn't always have to come around...

F - Y9, Keynote, Lecture
Lynne McClure, Cambridge Mathematics

Whatever year you choose, you can usually find a country that is rethinking the maths curriculum. It may be as part of the regular planned reform which take place every so many years, like Japan. It may be because there is a dissatisfaction with international league table positions, or maybe because the political situation has changed, heralding a different educational philosophy or pedagogy. Designers borrow from countries they see as successful and to a large extent what goes around comes around.

At Cambridge we are trying something different. We are designing a tool which will allow policy makers, designers of curriculum, resources, assessment and PD to benefit from the maths education research that has been done over the past years, to embed the affordances of technology to expose students to ways of working that weren't hitherto possible, and to explore making that content relevant to the 21st Century. Come and see what we're up to!

A4 Mathematics capability clusters

All levels, Keynote, Lecture
Rob Proffitt-White, Australian Curriculum: Mathematics

When teachers are given time to immerse themselves in the right experiences, and school leaders are able to value, create and sustain the right conditions, then research can make the right impact and transform the way mathematics is taught.

This cost neutral, state department project has evolved by identifying and remediating the problems of practice usually associated with scaling up evidence based professional learning. Endorsements and national awards have further strengthened the regional unity and urgency that investing in teachers is the right thing to do.

'In my 25 years of experience it is rare to find such a large –scale transfer of research knowledge into practice within mathematics educaiton'.
- Professor Merrilyn Goos, 2017.

The project utilises a cluster model that promotes collective efficacy and teacher ownership through bringing together primary and secondary school teachers and leaders. Participants have time to design, try out, validate and plan the implementation of instructional tools and diagnostic cycles. The collaborative leverage from 28 high schools and 44 primary schools, is refining and aligning the right words and actions for highly effective teaching. This extensive network allows collegial reflection of both their own practices and analysis of their own student's thinking.

'Your resources are the most practical and comprehensive set of supports for the Australian Curriculum: Mathematics that I have ever seen. Certainly, this type of support is well in advance of anything in Victoria,' Professor Peter Sullivan, 2017.

Rob has international experience in primary and secondary teaching and is currently a Principal Curriculum Advisor. He is a passionate and creative change maker. Rob has channelled his expertise into one of Queensland's largest initiatives that is making a difference to thousands of students and winning the hearts and minds of teachers.

A5 The challenges of teaching with challenging tasks

F - Y4, Keynote, Lecture
James Russo, Monash University

Teaching with challenging tasks in the early and middle years of primary school can support the development of student reasoning and unleash critical and creative mathematical thinking. However, using such tasks effectively requires the development of a classroom community characterised by reliance and appropriate risk-taking. In this presentation, Russo will present data from his own research describing teacher and student reactions to challenging tasks across two terms of work in Years 1 and 2. Key anticipated audience outcomes from the presentation include:

workshopping several challenging tasks, which F-4 teachers can use with their own students;

- learning that there is more than one way of effectively structuring lessons involving challenging tasks;
- understanding that enabling and extending prompts should be designed with the primary learning objective of the lesson in mind;
- appreciating that lessons involving challenging tasks can be emotionally and intellectually demanding for teachers and students alike, and that classroom management challenges should be anticipated when such tasks are first incorporated into mathematics instruction.

A6 Making early mathematical explorations count

Early childhood, Keynote, Lecture
Nicola Yelland, Flinders University

Young children are naturally curious and want to explore their world in order to make meaning about the experiences, objects and ideas that they encounter. Mathematics and the concepts inherent to it, can provide them with the language and skills to support explorations, document their discoveries, and to communicate and share their findings to an audience. Knowing, and using these skills enables numeracy, and literacy, which then act as the foundation for problem posing, problem solving contexts, and all future investigations, that contribute to satisfying a curious mind. What 'counts' as mathematical knowledge is outlined in the Australian National Curriculum, and in the preschool years the Early Years Learning Framework sets the scene for how young children might embark on such investigations as confident, competent learners.

In this presentation Nicola will highlight some of the ways that early childhood teachers (birth to 8 years of age) can create contexts for learning the mathematical skills and knowledge that we hope will be useful in their lives. She will illustrate the main ideas with examples from research projects in which empirical data from Australian early childhood centres and classrooms and contend that early explorations in authentic contexts are fundamental to understanding mathematical ideas and using them to become fluent and numerate.

SESSION B, Thursday, 11am-12pm

B1 2017 Math Methods examinations

Y10 - Y12, Lecture
Allason McNamara, Trinity Grammar School and Mary Papp

Mary and Allason will do a similar session to the 2018 MAV Meet the Examiners Lecture for Mathematical Methods as well as discuss common errors from previous years. Mary will review exam 1 in detail and Allason will discuss the multiple choice and extended answer section from exam 2. There will be a brief discussion about the 2018 Northern Hemisphere examinations. Participants will be given time to ask questions and will receive access to the PowerPoints used in the presentation via a MAV link. The MAV fully worked solutions will be made available as well. New teachers to Mathematical Methods are encouraged to come along. Bring the exam papers.

B2 Teaching and assessing mathematical proficiency using evidence based practices

F - Y6, Workshop
Paul Staniscia, St Joseph's School

One can argue that successful learning and teaching of mathematics in much more complex than three Content Strands and that it involves more of a mental disposition. In order to develop this disposition, as 'mathematics is what mathematicians do' (Milgram, 2007), one must be emerged and challenged within a task. Mathematical proficiency is one way of explaining this mathematical disposition and through evidence based practices, one can begin to see what is meant by mathematical proficiency. However, questions still remain; how do evidence based practices support the successful learning and teaching of mathematical proficiency? How can teachers accurately assess mathematical proficiency? And in what ways can students' responses be used to assess their mathematical proficiency?

B3 Explore ratio and scales with graphing calculators

Y4 - Y9, Commercial, Workshop
Pumadevi Sivasubramaniam, Nurul Shahhida and Abu Bakar, Institut Pendidikan Guru Raja Melewar

This workshop provides a hands-on experience for participants to explore ratios and scales using lines. The power of the graphing calculator will illustrate a fun filled lesson, which everyone will enjoy. Even if you have never used a graphing calculator, you will be able to master the operation during the workshop in a matter of minutes. The content of the workshop has been tried out in schools (with students and teachers) and the results have proved to have positive effects on students understanding and ability to aid understanding of ratios and scales. It also aids teachers to overcome pedagogical difficulties in teaching ratios and scales. The workshop is based on the theory of distributed cognition, which claims that when a powerful tool such as the graphing calculator takes over routine tasks such as drawing of lines and routine calculations, it allows students to focus on more relevant activities such as understanding the calculations. In addition to all these exciting features, the workshop will also provide a means to evaluate understanding using HOTS items. TI-Nspire calculators. Note from presenter - is applicable with Casio but the steps may differ.

B4 What is mathematics?

Y5 - Y10, Repeat, Workshop
Karim Noura, Melbourne Polytechnic

In this presentation, teachers will share ideas and experience on teaching and learning mathematics. By using and sharing practical examples, we will be able to answer the following questions:

Q1 What is mathematics?

Q2 Why do we learn and teach mathematics?

Q3 What do we teach at schools and universities?

Q4 What strategies do we use in teaching mathematics?

Q5 What kind of activities do we use to enhance the teaching and learning of mathematics.

In my presentation, I will focus on:

- Teaching mathematics with problem solving approach
- Linking what we teach in the classroom to real life situations
- Leading students to further study.

B5 Mathematics in 'The Greek Anthology'

Y7 - Y12, Repeat, Lecture
Terence Mills, Deakin University

'The Greek Anthology' is a large collection of very short pieces of writing from ancient Greece, which were compiled over several centuries. A translation in English is available in 16 books spread over 5 volumes. The writings in this anthology include inscriptions copied from buildings, poems, and epigrams. However, book 14 is quite different from the other books. Sprinkled throughout book 14 are 45 elementary mathematical problems.

Now Pythagoras, Euclid and Archimedes are household names in the history of mathematics in ancient Greece. However, 'The Greek Anthology' is not so well-known in mathematical circles. The purpose of this presentation is to describe these ancient problems. Perhaps they can be used to enrich mathematics in the classroom, or to make innovative connections with subjects such as classical studies or ancient history.

B6 Essential thinking strategies for number facts

F - Y6, Repeat, Commercial, Lecture
John Hein and Michael Ozbun, St James the Apostle School

We will explore different strategies, which enable successful teaching of number intervention including how and why thinking strategies work. Help build student confidence using these powerful visual models to develop fluency with number.

We will address identifying students at risk, assessment of understanding and teaching intervention in small groups and whole class setting.

This presentation is based on the research of Bob Wright, the Learning Framework in Number (LFIN) and Origo's Box of Facts. We have been trained in LFIN by Bob Wright and have been successfully implementing both LFIN and Box of Facts strategies for the previous two years.

Are you...

- Interested in building student confidence in numeracy?
- Looking to explore intervention implementation in your school?
- Curious how to move consistent strategies across the school?
- Wanting to identify and target the right students?

If you answered 'Yes' to any of these, then we hope you come along! Participants will be have the option to bring materials which allow them to take notes e.g. electronic device or pen and paper.

B7 Metacognition: reasoning and thinking through problem solving

F - Y6, Repeat, Commercial, Workshop
Marissa Cashmore and Laura Maclean, Banyan Fields Primary School

I have been part of the primary maths/science specialist program in 2016. We will be showcasing some rich/open ended problem solving tasks that can be differentiated to cater for students from Foundation to Year 6. One of these lessons will be part of or all of a Maths300 lesson. During this presentation we will be using questioning and metacognition techniques that will show case students critical and creative reasoning and thinking skills.

The aim of our workshop is to have participants walk away with some authentic, meaningful lessons to try in their own classrooms. However, we are also expecting participants to take away strategies and questioning techniques to use that would allow their students to confidently share their thinking and reasoning in a verbal, visual or hands on way. Pen and paper will be needed for note taking.

B8 Improving students' outcomes through knowing your impact

F - Y12, Repeat, Commercial, Lecture
Alexander Young, Ingenious Technological Enterprises

The author collaborated with schools in three states to develop a 'world first' means for teachers to improve their students' outcomes through 'assessment for learning' and knowing their impact. When teachers use pre-test/post-test analysis in their everyday teaching they learn how effective their impact has been.

This has enabled teachers to 'change their lives and that of their students', or as a speaker at the ACEL 2012 conference put it; 'The students in her school, on average, learn at twice the pace of the nation and at twice the usual depth'. The author has found a large proportion of schools' NAPLAN results appear to be 'flat lining' whereas licensees' NAPLAN results are improving, year on year.

B9 Portions of proportions

Y5 - Y7, Workshop
Jill Cheeseman and Ann Downton, Monash University
Carly Sawatzki, University of Canberra

We have been designing and experimenting with tasks that are productive ways to encourage upper primary students to think proportionally. We have found that, when given tasks that are meaningful to students, this is an achievable aim. We are happy to share the tasks, the reactions of students, and our findings. We also invite teachers to bring interesting task to share with participants in this workshop.

SESSION B, Thursday, 11am-12pm (cont.)

B10 Puzzles, problems and tricks of the trade

Y7 - Y10, Workshop
Mike Ristovsky, Christ Church Grammar School

It is not always easy to captivate kids in the mathematics classroom, but with some carefully crafted activities it is possible to get kids talking about the joys of mathematics that will allow teachers unique access to student thinking.

This session will run through 10 of my favourite activities, that I have accumulated over the past 20+ years of teaching secondary students in classroom settings. These activities have been chosen as they allow students to explore mathematics and make decisions and discoveries with the teacher acting as a facilitator rather than an instructor.

Participants will be guided through the activities at an easy pace, accessible to all. Handouts will be provided so the material can be used in classes on Monday morning. Please bring a calculator if you have one with you and an inquisitive mind.

B11 For the love of Maths 300

F - Y6, Repeat, Workshop
Ellen Corovic and Jennifer Bowden, The Mathematical Association of Victoria

During this session, Jen and Ellen will explore a handful of rich and challenging tasks developed by Maths 300. Teachers will develop their knowledge of how to navigate the Maths 300 resources and they will be engaged with hands on-tasks set to provoke mathematical thinking. Teachers should be prepared to test and justify their understandings as well discuss and justify the merits of engaging learners in meaningful and authentic tasks.

B12 Picture puzzles

Y3 - Y10, Workshop
Doug Williams, Mathematics Centre

One screen, two learners, concrete materials and a challenge. A different way to make use of computing devices to help students learn to work like a mathematician. More pictures than words. Multiple levels of content challenge. Mathematics that is concrete, visual and makes sense. Teaching craft that encourages mathematical conversation. A menu-based approach offering choice to students. This is an opportunity to explore these PDF slide shows from Mathematics Centre and ponder how you could create your own. You will need your own web-connected computing device to use with a partner.

B13 Inquiry based, student centred pedagogies can improve the mathematics learning of all students

F - Y6, Lecture
Peter Sullivan, Monash University

When students solve mathematical problems for themselves not only do they connect new ideas with what they already know but also they are more likely to remember and transfer their knowledge. There are a number of important steps in planning such learning. Problems and tasks can be introduced without telling the students what to do, the teacher can facilitate the learning rather than 'telling', the tasks can be differentiated for students who experience difficulty and those who finish quickly, and follow up tasks can be created to consolidate the learning activated by the initial problems. Examples of learning sequences will be presented, including from the reSolve project, to illustrate the stages of individual lessons and sequences of lessons.

B14 Minimising teacher planning time while improving student outcomes

Y7 - Y12, Repeat, Commercial, Workshop
Bill Murray, Mentone Girls Secondary College

The cloud-based Classroom Organiser topic/lesson planning and student tracking system will enable teachers to prepare every individual topic/lesson plan required for the year in a live document that can be updated in real time. The lesson plan will be accessible by teachers, students and parents in real time. The system will also track student progress in real time. Student assessments can be transferred to students and parents (using separate log-ins) within a few days of test completion. The system enhances student self-paced learning and encourages students to work through various levels of achievement.

The system helps teachers to differentiate to meet individual student needs for consolidation or extension. The system will:

- Minimise lesson planning time (this is a considerable time saving for teachers)
- Engage students constructively in planning and organising their work in a self paced manner.
- Enable teachers, students and parents to see student progress in REAL time. (note that this is indicative and not prescriptive and does not involve a increasing teacher scrutiny of student work)
- Enable teachers and students to work collaboratively during a lesson to achieve the desired lesson outcomes

to meet student needs. The lesson plans can be changed during a lesson and students will have access to these changes in real time.

The system is free to use. To download go to classroomorganiser.com.au.

B15 The art of learning through investigation

F - Y6, Workshop
Leah Smith and Hayden Wardrop, Morang South Primary School

Are you looking to take your student's maths learning to the next level? This hands on workshop gives you in-classroom experience from teachers who are travelling this investigative journey with their students.

This year at Morang South Primary School we have begun to create real life authentic experiences that relate to our students own worlds. We have started to see the impact these investigations have on our students learning, depth of questioning and ongoing collaboration. These investigations have encouraged students to explore their thinking and create their own learning math pathway. It is essential for anyone who is looking for ideas on how to plant a seed that could grow in any mathematical direction.

B16 Number Talks in the early years

F - Y2, Workshop
Sally Burke, Derrimut Primary

Number talks: where students curiosity is fostered through engagement of collaborative mathematical conversations. Through the use of number talks we are able to unpack the big ideas around number sense, enabling students to build upon each others knowledge to solve problems. In this session Sally will engage participants in hands on experiences mimicking the process foundation level students would go through when solving a number talk problem. Sally will also explore the process teachers at Derrimut Primary school went through to embed Number talks in the early years. Teachers will leave this session with activities that they can use in their classrooms. A variety of number talk problems will be provided for teachers to trial too.

B17 Utilising codable robotic devices in primary mathematics classrooms

F - Y6, Repeat, Workshop
Max Stephens and Duncan Symons, The University of Melbourne

Student-friendly robotic devices such as BeeBot, Ozobot and Sphero introduce young students to systematic thinking to solve problems using a sequence of steps and decisions. The goal is to teach students that multiple starting points are possible, and that solution steps can be reviewed, revised and improved by class discussion. This session will show how these digital technologies fit readily with key content areas of the Victorian primary mathematics curriculum, and connect directly with critical and creative thinking. They provide opportunities to demonstrate and explore algorithmic thinking, providing a natural bridge to visual-programming languages such as Scratch. This session will be interactive and will illustrate practical approaches to utilising robots in the primary classroom. Resources will be provided to illustrate the key goals for mathematical thinking from early childhood and Prep through to Year 6 with specific reference to the Victorian Curriculum: Mathematics. You may bring your own robotic devices and any resources you have found helpful.

B18 Investigating complex numbers using series

Y11 - Y12, Repeat, Workshop
Ray Williams and Wendy Watts, St Mark's Anglican Community School

Within this session participants will investigate the properties of complex numbers when multiplied using the TI Navigator wireless system to work collaboratively. The TI-Nspire CAS calculator will be used to graphically represent the partial sums of a number of complex series and the effects on these depending upon the magnitudes of the complex numbers involved. Participants will be able to adapt and use the results in classroom investigations involving complex numbers at both Year 11 and 12 levels. Participants are encouraged to bring their own TI-Nspire calculator, however there will be spare calculators made available if required.

B19 Anticipating the Cambridge Maths Framework: making connections

F - Y9, Repeat, Workshop
Lynne McClure, Cambridge Mathematics, Keynote presenter

One of the design principles underpinning the Cambridge Maths Framework is that of connectedness. In this session we'll play with some intriguing contexts or intriguing maths to: make connections between fluency, reasoning and problem solving; promote success through supporting thinking at different level of challenge; encourage collaboration, confidence and creativity, and make connections between domains. We'll use Ruthven's three stages of exploration, codification and consolidation to structure our activity.

SESSION B, Thursday, 11am-12pm (cont.)

B20 Outcomes through games!!

Y2 - Y6, Repeat, Workshop
Peggy Ashton, Latrobe University

Games are a powerful tool in the teaching of mathematics. While students engage with mathematics in this enjoyable way, valuable assessment information can be recorded. In this workshop we will discuss the value of incorporating games into the maths teaching program. We will explore a selection of games that have been matched to the Victorian Curriculum, Number and Algebra content. A copy of all materials will be provided (USB).

B21 Strategies to enhance geometry understandings

Y1 - Y6, Commercial, Workshop
Richard Korbosky, Dapma Pty Ltd
John Lawton, Objectives Learning Materials

This workshop will be 'hands on' aimed at developing young students understanding, thinking and reasoning skills in geometry. There will be a focus on manipulative mathematics materials to help students to visualise, communicate, draw and reason accurately. An important thinking skill for students to develop is the ability to visualise. They should be able to connect 3 dimensional models to their 2 dimensional representations. The ability to look at drawings or pictures to see the mathematics needs to be developed. Students need to progress from manipulative materials to drawings to abstractions and it should not be rushed. Participants will be introduced to the new mathomat (primary) which has been specifically designed for primary classrooms so that students can accurately draw, name and investigate properties of shape. This mathematics tool gives students the opportunity to develop creative thinking in geometry.

B22 The mathematics of wind design

Y9 - Y12, Repeat, Lecture
Michael O'Connor, Australian Mathematical Sciences Institute (AMSI)

An excellent example of where maths is used in modern civilisation. December 17 marks the 115th anniversary of the first human powered flight. Since then humanity has gone on to make air travel a daily event for millions of people. In order to make this a reality it was necessary to understand how to produce forces that would overcome gravity and air resistance. The mathematics involved in designing and building a plane can all be acquired by the end of Year 12 from Methods and Specialist content. As a way of demonstrating how and where high school mathematics is needed in the modern world, powered flight is an example par excellence.

B23 Real, rich and fun- creative open-ended math tasks

F - Y4, Workshop
Bree Collins, Windsor Primary School
Tim Colman, Glendal Primary School

Engage young learners through rich open tasks that are hands on, fun and full of learning! Open ended, rich tasks are a fantastic way to engage young learners, encouraging student ownership, self-direction, and engagement. This workshop will explore activities that promote problem solving skills, enhancing students' problem solving, thinking and reasoning abilities. Through these activities, we will discuss the way the teacher can become a facilitator in the process, probing student thinking as well as actively enabling or extending students.

B24 Creating critical thinkers

Y4 - Y9, Repeat, Workshop
Stephanie Grenfell and Shelley Clancy, St Joseph's Primary School Cobram

This session will cover how we have changed our teaching practices to include more opportunities for rich learning, critical thinking and problem-solving. See how we have overcome the challenges of introducing more rich tasks, while still meeting every student's point of need. You can take some practical strategies back to the classroom, with some of our favourite energisers for the beginning of lessons that have multiple points of entry.

Changing the way we teach has helped us equip our primary students with 21st-century skills, which they can take through to their higher levels of schooling at our feeder secondary schools.

B25 Just right maths!

Y3 - Y10, Repeat, Lecture
Yvonne Reilly and Jodie Parsons, Sunshine College

Using differentiation to create a fully inclusive classroom. In this session we will look at an effective way to design and deliver differentiated activities to ensure every student, regardless of ability, feels included in the classroom. This session will provide practical examples of how to create differentiated tasks and describe the delivery strategies which will ensure successful outcomes for students and satisfying classroom experiences for teachers. We will be sharing some resources with you, so please bring a USB.

B26 Take a chance on me!

Y4 - Y9, Repeat, Workshop
Lewis Gunn, Thi Pham and David Cleary, Red Cliffs Secondary College

This workshop presents our implementation of an inquiry based teaching approach with an emphasis on constructivism and reflection in middle years mathematics and the benefits this has had for the engagement and learning of all our students, particularly for those who were previously disengaged from their learning. In the Year 8 probability unit of work, students utilise an inquiry based approach to create their own board-games. Ensuring that the games are successful and fun to play requires a deeper and more meaningful understanding of the real-world impact of probability than is often achieved in the traditional, textbook learning approach. In addition to reviewing the inquiry based approach, workshop participants will have the opportunity to design, play and evaluate their own probability based board-games and then consider how the reflection process can be used to further develop students' understanding in the maths classroom.

B27 Developing UDFs, notes pages and widgets

Y10 - Y12, Repeat, Lecture
Chris Ireson, Melbourne High School and Texas Instruments T3 National Instructor
Len Bedier, Melbourne High School

Learn how easy it is to write and use User Defined Functions (UDFs), notes pages and widgets on the TI-Nspire CX CAS calculator to aid your students in Technology Active Assessments. From finding equations of straight lines to finding graphical information about an equation in one step, these ideas can be applied to almost all topics that have CAS applications. Please bring your TI-Nspire CX CAS calculator to write your own UDFs and widgets and to receive some sample ones as well. Not suitable for a Casio calculator.

B28 How to teach decimals better

Y4 - Y9, Workshop
Michael O'Reilly and Norrian Rundle, Norrian Michael Maths Education

In this session we will look at an easy to implement diagnostic test to identify common decimals misconceptions held by students. These misconceptions will be explored, as will a range of teaching strategies to address them. The concrete teaching aid, Linear Arithmetic Blocks (LABs), will be demonstrated. These can be constructed by participants and used to teach place value and decimals. Participants will receive copies of files and handouts, as well as detailed instructions for constructing the LABs. Bring along a USB stick for take home resources.

B29 Are you neglecting the 21st Century? Collaboration, communication, problem solving

Y7 - Y10, Lecture
Ashley Peacock and Lindsay Hill, Ivanhoe Girls' Grammar School

Are you sick of being told we need to prepare our students for the jobs of the '21st Century'? I know I am. We all think that we are teaching collaboration and communication skills to our maths students, but how do we measure it? How do we explicitly support it? We have just a couple of answers. Warning: answer may involve rubrics. Based on our curriculum development at Year 7 we will demonstrate and provide some explicit teaching techniques to support group problem solving and collaboration. All this whilst still teaching all of that 'bad stuff', like maths skills and the curriculum.

B30 Using assessment for creative and critical learning experiences

Y4 - Y8, Repeat, Lecture
Pauline Rogers, Essential Assessment

Learn and experience how to start with something simple such as an assessment question to create your own critical and creative thinking and learning experiences in the classroom. The session will explore critical and creative thinking in the mathematics setting, and then show how assessment materials could be used as the starting point to develop these experiences. Using assessment materials may provide students with the opportunity to develop resilience and perseverance when presented with assessment questions, that they find challenging. Participants will have time during the session to develop some activities to share and then take to use in their own classrooms.

B31 Caring matters

Y4 - Y9, Lecture
Ray Peck, Australian Council for Educational Research (ACER)

In the World Mathematics Year 2000 Student Essay competition conducted by the MAV, students described the behaviours and characteristics of their best teacher of mathematics. Caring was a common theme. This option will present a 5-dimensioned teacher-student interaction framework and share practical ways to build positive

SESSION B, Thursday, 11am-12pm (cont.)

relationships with students in mathematics to enhance learning, enjoyment and confidence. Three of the five framework dimensions (framing mathematics ability, acknowledging student contributions, setting the emotional tone) are most applicable to mathematics and predictive of improved learning. Participants will be also invited to contribute ideas from their own practice. An ongoing interest group may be established.

B32 A look at networks and decision mathematics

Y10 - Y12, Repeat, Commercial, Lecture
Vicky Kennard, Australian Mathematical Sciences Institute (AMSI)

Connecting the mathematics students learn in class to the 'real world' and showing its relevance to their future lives is the number one challenge for maths teachers. AMSI have developed a unit of work for teachers who deliver the Further Maths module on Networks and Decision Maths based on real world examples in the airline industry. The presentation will showcase this resource.

B33 Digital diagnostic assessment - be smart about planning

Y7 - Y10, Repeat, Commercial, Workshop
Vanessa Rule-Paddle and Antje Leigh-Lancaster, Pearson

This session focuses on how using digital diagnostic assessment tools can positively impact planning for learning to more specifically focus on students' needs. It draws on several studies which have shown how teacher planning has been positively impacted by such tools, where diagnostic information about students' thinking as well as teaching advice consisting of potential student difficulties and how to address these is provided to the teacher. Participants will have the opportunity to engage with the diagnostic tests, diagnoses and targeted teaching advice.

B34 Learning how to reason in junior secondary - scaffolding mathematical reasoning

Y7 - Y8, Repeat, Commercial, Lecture
Carolyn Smales and Brad Gaylard, Firefly Education

Many classroom teachers equip their students with strategies for interpreting and unpacking mathematical problems, however less time is given to the 'how to' of reasoning. Reasoning skills do not come naturally to many students, and need to be modelled and scaffolded for them. What exactly do we mean by 'justify your answer'? Or 'explain your method'?

In this presentation, teacher and author, Carolyn Smales, will demonstrate how simple mathematical reasoning questions can be used to build a bank of reasoning skills. She will present problems that stimulate and challenge mathematical thinking, and demonstrate how to use problems to unpack the cognitive skills that students need to become proficient reasoners.

She will also show how these principles have been applied to Bit Maths - a forthcoming secondary maths program, which employs a Reasoning Wizard to explicitly guide students through the cognitive process of unpacking reasoning questions.

B35 STEM is hiding everywhere

Y7 - Y12, Workshop
Rodney Anderson, Moreton Bay College

Are you interested in using activities that incorporate mathematics and coding into your classroom? In this hands-on workshop you will use the TI-Innovator Hub along with motors, lights, and other sensors (temperature, motion, etc) to create and use programmes to connect to real world problems. We will use existing programmes, modify programmes and create our own. All equipment is provided.

B36 Design Thinking for VCAL numeracy

Y10 - Y12, Repeat, Workshop
Kris Ellery and Leah Whiffin, Bendigo Senior Secondary College

In VCAL numeracy disengaged students are one of our biggest challenges. We know students can be disengaged for any number of reasons. One major reason is a lack of self belief which inhibits students from trying for fear of being 'wrong'. Design Thinking is a methodology that guides teachers into creating projects where students feel more confident to participate, take risks and incorporate other skills into their maths. Design Thinking projects don't have 'one right answer' and allow students to work at their own level.

In this session teachers will participate in a hands on activity in small groups while learning about the five stages of Design Thinking.

B37 Adusu algebra: concrete materials for teaching algebra

Y7 - Y10, Repeat, Commercial, Workshop
Ruth Adusu, Adusu Algebra

Adusu Algebra is a concrete materials kit developed by full-time mathematics teacher Ruth Adusu who has 30 years of

experience in the classroom. It allows students to physically build and manipulate expressions, equations and inequalities. By bringing algebra 'out of the abstract and into the physical' it avoids or eliminates common misunderstandings, provides immediate feedback, supports correct mathematical working, simplifies algebraic processes, allows student to explore questions, and improves recall. Differentiation in the classroom is also facilitated by the use of Adusu Algebra.

Participants will use a student kit to complete a variety of algebraic questions to experience for themselves the value of having a hands-on tool for algebra.

Attending this session will give teachers fresh insight into how students think about algebra and provide strategies to better equip their students to approach algebra with confidence, regardless of whether any products are purchased.

B38 Retrieval practice and concept development using Desmos activities

Y7 - Y12, Lecture
Bryn Humberstone and Katie White, Brighton Grammar

Desmos is widely known as a free and highly intuitive graphing calculator suitable for classroom demonstrations. However, it also allows teachers to design, share and run classroom activities that can be used to foster and check for student understanding. Additionally, mathematics teachers are becomingly increasingly aware of the cognitive science research into learning and the advantages of retrieval practice and interleaving of topics. This presentation will show how Desmos was used in Year 7 – 12 mathematics classes to embed retrieval practice and interleaving in parallel with a traditional curriculum ordering. Additionally, you will see examples of how Desmos activities were used for concept development, topic previews and topic reviews. The focus of the presentation will be the 'how', including how the activities were run and how student responses influenced subsequent teaching. No prior experience with Desmos or Desmos activities is necessary. Optional: bring along a tablet/laptop to experience some of the tasks from a student perspective.

B39 Exploring common place value misconceptions in Years 1-6

Y1 - Y6, Workshop
Angela Rogers, RMIT University

This session will unpack several common misconceptions that have emerged from my place value research. The face value misconception, 600-block misconception and the negative impact of independent column thinking will be explained and explored in a classroom context. Practical ideas for assessing and addressing these misconceptions will be explored and a framework to support the teaching of place value in Years 1-6 will be presented.

B40 Using picture story books in numeracy

F - Y6, Workshop
Jade Seddon and Jen Briggs, Derrimut Primary School

The use of picture story books is a great way to engage young readers, in fact any reader! This workshop will explore how teachers can use books to capture students' imagination and prior knowledge. A selection of picture books will be shared along with tasks that engage students to expand and extend their mathematical thinking. This is a hands-on creative session where teachers will be actively involved in discussions and activities.

B41 Big books for marginalised learners: early years

F – Y3, Workshop
Robyn Jorgensen, Univeristy of Canberra, Keynote presenter

Much of early numeracy has a strong literacy basis so for early learners coming to learn mathematics is as much about literacy as it is about mathematics. This workshop has two main goals. The first to create word walls of frequently occurring mathematical terms that can creat stumbling blocks for early learners. Participants will then create drafts of big books that they can use in their classrooms to support learners negotiate the literacy demands of mathematics.

SESSION B-C, Thursday, 11am-1.20pm

B-C1 VCE Mathematical Methods - use TI-Nspire as a teaching tool

Y10 - Y12, Double Session, Workshop
Sanjeev Meston, Lakeside College

This session will focus on using all the TI nspire Applications (Calculator, Notes, Graphing, Geometry, List and Spread-Sheet, Data-Statistics, Program Editor and Vernier-data Quest to enhance and simplify conceptual understanding of the Mathematical Methods course. These skills can be extended to both Further and Specialist Maths course as well. The participants will receive ready to use files. What you will need - TI-Nspire Software or hand held.

B-C2 Algorithmic and computational thinking using R Software

Y10 - Y12, Repeat, Double Session, Workshop
Nazim Khan, St Mary MacKillop College

This workshop will provide participants with a hands on experience on implementing R software in their senior mathematics courses. R is an open source and internationally renowned software with capabilities that far surpasses the Graphics Calculators. In addition to using the implemented functions in R, students will have the freedom to manipulate R codes to create their own functions, as well create new functions and consequently undertake bigger projects (using R codes) in mathematics like modelling real-life phenomenon using mathematics functions and make inferences. The workshop will attempt to provide examples of using R in the following topics: Functions and Graphs, Trigonometric and Inverse Trigonometric Functions, Exponential & Logarithmic Functions, Counting and probability, Arithmetic and geometric sequences and series, Differential & Integral Calculus and Applications, Statistics: Discrete & Continuous Random Variables; Point and Interval Estimates; Statistical Inference, Combinatorics, Vectors in the plane and 3D, Matrices; Real and complex numbers. Participants are required to install R software from the following link and bring along their laptops: https://www.r-project.org.

B-C3 Limited by our own imagination!

Y10 - Y12, Repeat, Double Session, Workshop
Craig Browne, TI Australia

This workshop is designed to help participants get started in creating dynamic files using the Notes Page Application on the TI-Nspire CAS calculator. The workshop will feature examples of files that answer problems efficiently as well as examples of files that are used as effective teaching tools. The workshop will finish with the participants being shown how to create their own files. Content covered in the workshop will vary from year 10 level through to Year 12 level, with examples from each year level demonstrated. It is intended that by the end of the workshop participants will have gained enough skills to create their own files or modify files that they have been able to secure. Laptop with TI-Nspire CAS Calculator Teacher Software version 4.5 installed. TI-Nspire CAS calculator can be used but it is more cumbersome! The skills are relevant to the TI-Nspire CAS technology only.

B-C4 Spatial reasoning: a curriculum for early childhood mathematics education

F - Y2, Double Session, Workshop
Rachel Pollitt, The University of Melbourne

In early childhood education, knowing which aspects of mathematics are important to teach and knowing how to support children's individual interests in their mathematics learning can be challenging. A focus on spatial reasoning provides a play-based approach to the teaching of mathematics in early childhood. This workshop presentation includes an introduction to specific methods and materials designed to assess children's spatial reasoning knowledge in play-based environments. The workshop includes opportunities to engage with materials and concepts including visualisation, orientation and spatial language to explore how spatial reasoning can provide a foundation for the planning of children's mathematics learning. The workshop will demonstrate how the inclusion of spatial reasoning in everyday practice supports an early childhood mathematics curricula, which is applicable to everyday practice and play-based philosophies of learning.

B-C5 Using formative assessment to plan differentiated instruction in mathematics

F - Y10, Repeat, Double Session, Lecture
Lindsay Wehrwein, Brookside P-9 College
Andrew Cordell, Victoria University Secondary College
Natalie Edwards, Parkwood Green Primary School

Meeting the diverse needs of a class of students is often identified as a teacher's most significant challenge. This presentation will focus on the work at several colleges, catering for students in Mathematics from Prep through Year 10. Through an action research process using student formative assessment data to drive instruction, significant gains are being observed. This process involves using multiple data sets, including data from authentic student work, alongside developmental progressions, to create multiple lesson types that explicitly differentiate learning experiences to cater for different cohorts of students within one class. Assessment tools used include common standardised assessments together with problem-based (5-Practices) lessons. Data gathered is triangulated to establish a students' development level at a specific point in time. What teachers are discovering once having started on this journey is that it is impossible to revert to a traditional whole-class model of instruction.

B-C6 Addressing individualisation of teaching using technology: re Gonski recommendations

Y7 - Y10, Commercial, Double Session, Lecture
Robert Rook, Mathculator

The maths tutor addresses individualised learning of standard questions from topics providing infinite questions due to the random generation of questions. Help is available for students struggling with questions, both textual and spoken.

Questions/answers are saved to a database for individual student, class and year level allowing for teacher/school viewing of results/progress. All work at the computer is at the individual student pace/level and results both at home and at school can be accumulated. Students can add their thoughts regarding questions for help later from fellow students, parents and teachers. Students can email results to their teacher including questions attempted, answers and any questions that arose from any questions that students had concerns with. Worksheets and tests along with homework books personalised for schools can be generated. Participants receive free personalised copies of the software for their computers.

B-C7 Birth to Level 10 mathematics teaching toolkit

F - Y10, Repeat, Double Session, Workshop
Victoria Hall, Angela Scuderi and Marina Zhang, Department of Education and Training

The Department of Education and Training's Birth to Level 10 Mathematics Teaching Toolkit (the Toolkit) will support teachers by providing quality assured, multi-modal resources, access to current research and self-paced professional learning modules. These resources and supports have been developed by the Department with teachers and educators, maths and numeracy experts and the Mathematics Association of Victoria. Join us in this interactive workshop to explore the elements of the Toolkit and engage with these resources. Computer or tablet is preferred but not essential, writing tools and a notebook.

B-C8 'Leadership content knowledge': what do leaders need to know

F - Y10, Repeat, Double Session, Workshop
Nadia Walker, Benton Junior College

Whether you're a mathematics curriculum leader, an Assistant Principal or Principal, there is key knowledge and skills that are required to enhance the learning of students in mathematics. Most importantly, effective instructional leaders must be able to articulate their vision for mathematics teaching and learning, as well as differentiate between high quality and low quality instruction. In this session we'll use tasks and work samples from the classroom to identify high quality instructional practices, discuss ways in which leaders provide purposeful feedback to teachers and strategies for communicating expectations of high quality practice.

B-C9 Enrichment tasks for high performing students

Y7 - Y10, Repeat, Double Session, Workshop
Donna Callow and Jim Rizos, Glen Waverley Secondary College

We will explore some interesting enrichment tasks and problems suitable for high performing students at years 8 and 9, though could be adapted to other year levels. These have been used in our enrichment classes to help students to think mathematically and to introduce them to areas of maths not normally encountered in mainstream classes. Some discussion of how to create these tasks will take place.

SESSION B-C, Thursday, 11am-1.20pm (cont.)

B-C10 Creating impact with your TI-Nspire in Mathematical Methods

Y11 - Y12, Double Session, Workshop
Frank Moya, Educational consultant

Participants will learn ways of using dynamic features of their TI-Nspire CAS to construct interactive animations and simulations, creating more impact in the teaching and learning of key concepts in Mathematical Methods. Some under-utilised functionalities will be explored, include dynamic geometry tools, data capture, sliders and various types of random number generators. One of the activities will involve participants setting up simulations to demonstrate the concept of the sampling distribution, which is an essential element to understanding the topic of statistical inference for sample proportions. The use of dynamic computation in Notes pages and some innovative uses of the Lists & Spreadsheet application will also be investigated. The animations and simulations will be applied to a variety of topics, across the functions, calculus, probability and statistics areas of study. The workshop is primarily aimed at teachers who are currently teaching with TI-Nspire. Participants are encouraged to bring their own device. However, loan calculators will also be available if required. Other CAS platforms can also be used to carry out the activities, but TI-Nspire will be the featured technology.

SESSION C, Thursday, 12.10pm-1.10pm

C1 2017 Specialist Mathematics Examinations

Y10 - Y12, Lecture
Allason McNamara, Trinity Grammar School
Philip Swedosh, The King David School
Dean Lamson, Kardinia International College

Allason, Philip and Dean will discuss common student errors in the 2017 Specialist Mathematics examinations. An analysis of the multiple choice section will be given; by-hand skills will be discussed and different approaches to answering the extended answer questions will be outlined. Philip will discuss exam 1 in detail, Allason the multiple choice and Dean the extended answer. Participants will be given time to ask questions and they will be given access to the PowerPoints used in the presentation via a MAV link. The MAV fully worked examination solutions will also be made available. New teachers to Specialist Mathematics are encouraged to attend. Bring the examination papers.

C2 Moving towards more open and challenging tasks

F - Y6, Workshop
Michael Bairstow, St Dominic's Primary School

Teachers are hearing more and more about the importance of using rich, open tasks and embracing challenge. However this, like all changes, can be confronting for teachers and schools. How do we create and find tasks that are open and challenging? What parts of our pedagogy need to change? How are teacher groups, learning intentions and explicit teaching used within this pedagogy? These questions and others will be explored as we explore how one school has transitioned towards using open tasks and pedagogy that increases challenge.

C3 Teaching strategies for Further Maths

Y11 - Y12, Repeat, Lecture
Celeste Pryke, Christian College Institute of Senior Education

After five years of attending the MAV conference, the way I teach Further Maths has changed significantly. I have moved away from 'chalk and talk' and into pedagogy that is based on research and the best practice of many inspirational speakers at the MAV conference. I will share my experiences and the teaching strategies that work in my classroom, along with some of the research behind the strategies. Simple ideas such as warm-up questions, preparation videos, spaced practice and Guttman charts can reinvigorate your teaching. This session would be great for new Further Maths/General Maths teachers or teachers who are looking for something new to try in their classroom. Laptop (recommended).

C4 Quick is the aim, smart is the gain

Y5 - Y8, Repeat, Commercial, Lecture
Helen Barker, Anne Parnell and Troy Lowe, Numurkah Secondary College

QuickSmart is a numeracy intervention program that is offering fourth phase intervention (or in some cases a last chance intervention), to students between Year 5 and 8. It improves middle school students automaticity with simple maths operations, such as times tables; this frees up working memory to enable the students to process more complex mathematical computations. At Numurkah Secondary College we are now in our fourth year using the QuickSmart program. NAPLAN and PAT testing results show improved scores when compared to the control group.

The 6's component of the program has been used with our top Year 12 students to improve their ability to discriminate which skill to use and to interpret multifaceted exam questions.

C5 Reasoning: the forgotten proficiency

F - Y6, Repeat, Lecture
Michael Nelson, Portarlington Primary School

This presentation will explore the research around reasoning in mathematics and its importance to developing complete students of mathematics. Its major focus will be on how teachers can implement the teachings of the research, what they look like for the teacher and what they look like for the students. Its purpose is to assist teachers in integrating a strong research based reasoning program within their current teaching program, rather than sitting as a separate entity. Teachers will see how what they are already doing can be modified to emphasise reasoning and be used to increase students ability to transfer their knowledge as well as solve problems. Delegates are not required to bring anything for this presentation.

C6 Problem solving in primary mathematics

F - Y8, Repeat, Commercial, Workshop
John West, Edith Cowan University

Mathematical problems arise in almost every aspect of students' lives yet few leave school with an appreciation of mathematics as a powerful tool for problem solving. Problem solving in primary mathematics provides a concise introduction to mathematical problem solving. Each chapter explores a specific mathematical problem solving technique. The book contains more than 45 fully worked examples and over 200 problems (complete with solutions),

appropriate for students working at a wide range of levels. It is anticipated that this book will be a valuable resource for teachers, parents and students wishing to develop or expand their mathematical problem solving skills. Dr John West is a lecturer in mathematics education at Edith Cowan University in Western Australia. He has worked extensively as a mathematics educator, having taught at primary, secondary and tertiary levels both in Australia, Singapore, Hong Kong and Vietnam.

C7 Creating impact with Wolfram|Alpha

F - Y12, Repeat, Commercial, Lecture
Craig Bauling, Wolfram Research

Wolfram|Alpha helps millions of people each day explore their world through our world leading knowledge computation engine. In this session we will explore

how students, teachers and scientists are accessing it to help give them insight into their world. Craig will demonstrate the key features that are

directly applicable for use in teaching. Topics of this technical talk include :

- Enter scientific calculations in everyday English, or using the flexible Wolfram Language
- Visualise data, functions, surfaces, and more in 2 D or 3 D

Access trillions of bits of on-demand data

- Employ powerful analytics to your student's lab data
- Use semantic import to enrich your data using Wolfram curated data

Prior knowledge of Wolfram|Alpha or Mathematica is not required - new users are encouraged. This is a great opportunity to get faculty not experienced with Wolfram|Alpha and Mathematica involved and excited.

C8 Hands-on maths for Prep - Year 2

F - Y2, Repeat, Workshop
Anna Kapnoullas, Top Ten Resources

This presentation will focus on practical examples of hands-on mathematics for Prep, Year 1 and Year 2. This includes:

Early numeration using 3-dot dice, tens frames, bead slider number lines and LEGO.

Subitising and partitioning using engaging lesson hooks and easy-to-find materials.

- Addition using addition machines, strategies to develop students' 10 and doubles facts, playing cards, dice and dominoes.

Subtraction using numeracy picture books and students' real-life connections.

C9 Stripping out the detail

Y5 - Y10, Repeat, Commercial, Workshop
Vicky Kennard, Australian Mathematical Sciences Institute (AMSI) ChooseMaths

Constructing inquiry questions is an art. All too often the problems we present to our students already contain all the information they need and all the questions they could ask. They are often presented as multi-part questions, that lead the student through the inquiry. In this presentation I will demonstrate an alternative way of presenting an inquiry. By using visual prompts to allow the students to ask their own questions and request the data/information they need to answer their questions. These 'stripped-back' questions allow the students to follow their own interests and to see the usefulness of the data they request and the mathematical concepts and skills they use. Bring pen and paper, maybe a calculator.

C10 What's the rush? Using reflection to promote self-regulation

Y4 - Y10, Repeat, Workshop
Karen McMullen, Killester College

Often teachers are in a rush to cover the set curriculum but can this lead to a classroom of passive learners? Providing students with the opportunities to be more actively involved in their learning can have a positive effect on their achievement. One way of supporting students to be more actively involved is through purposeful reflection on their learning. This workshop encourages teachers to use reflective learning techniques with their students to promote thinking and self-regulated learning. Participants will be exposed to a range of reflective tools they can use with their students along with examples of how they can be used in the classroom.

C11 Jumping frogs game, algebra, graphing ... yes!!!

Y6 - Y9, Repeat, Workshop
Ian Bull, St Kevin's College

We all play video games, games using cards, games on the computer, games of chance of all sorts and of course within the games that we play there is a structure which underpins and powers each one. All games have a structure and the

structure can be best described using mathematics in particular in the form of algebra and graphing. I have chosen a simple game to examine this called 'jumping frogs' where red and blue frogs need to change sides across a grid. This game opens up the mathematics that underpins it - pattern and linear and quadratic algebra. I will demonstrate what I presented to the boys at St Kevin's College.

C12 Problems worth exploring episode 2

Y7 - Y12, Workshop
Peter Fox, Texas Instruments

In this workshop we will explore even more infrequently asked questions. If you attended the 2016 workshop (episode 1), don't be afraid, we're exploring a whole set of new problems in this session; the type that provide multiple entry and exit points, span multiple mathematics disciplines, provide opportunities for extension and demand thinking. From paper folding to finding factors, the choice is yours, in this workshop participants get to vote on which problems they would like to explore. There is bound to be something here to stimulate your dendrites and engage your students

Sorry, due to time restrictions, the Riemann hypothesis will not be solved during this workshop.

C13 Factors, composites and primes - what's the problem?

Y4 - Y9, Repeat, Lecture
Dianne Siemon, RMIT University

Many students who know their 'tables experience difficulty with factors, composites and primes. This is because a deep understanding of factors requires a significant shift in thinking from the equal groups or repeated addition idea that underpin the traditional 'times tables' to the 'scalar' idea for multiplication that instead of focusing on the number in each group, the scalar idea shifts the attention to the number of groups or multiplier. Factors, composites and primes are much more than a topic or chapter in a textbook to be considered once or twice a year. They require an extended understanding of multiplication that is not supported by the equal groups, repeated addition view of multiplication or the 'times tables'. An alternate way of developing the multiplication facts that supports the factor idea will be considered.

C14 How long is a 30 centimetre ruler?

F - Y6, Workshop
Cassandra Lowry, Australian Mathematical Sciences Institute (AMSI)

Children are naturally inquisitive. They will explore the world around them, ask questions, take risks and make discoveries. Yet many students, after spending time at school, seem to lack motivation and appear content with a more passive approach to learning.

How can we recapture students' in-built curiosity and use this to explore a range of topics? How can we help students look beyond what is familiar and begin, once again, to question the things around them?

Participants in this workshop will be taken through such a challenge. They will begin with a familiar classroom object, a 30 centimetre ruler, and be introduced to a method of teaching that encourages students to share their knowledge, ask questions and explore their ideas. With the support of research, participants will discover how questions and wonderings can be used to not only introduce topics, but encourage a more active, engaging and rewarding approach to learning.

Participants are asked to bring a standard 30 centimetre ruler (and a sense of curiosity).

C15 Using teamwork to motivate students in the classroom

Y5 - Y12, Repeat, Workshop
Joseph Wright, The Educational Advantage P/L

Human competitiveness is a natural driver for most of us, and working in a team harnesses that drive in a non-threatening way. Achieving a goal as part of a team is a rewarding experience. Encouraged by teammates, students become more engaged in an activity, and as a result they learn more efficiently. Interestingly, the ability to work in a team is a powerful predictor for success in the workplace. Join us as we share some practical ideas that use teamwork in a group learning activity that also allows for recognition of individual contributions. Bring a laptop or a tablet.

SESSION C, Thursday, 12.10pm-1.10pm (cont.)

C16 Education Perfect: improve learning outcomes in maths

Y4 - Y9, Repeat, Commercial, Lecture
Clare Feeney, Education Perfect

Education Perfect is an online learning and assessment resource developed to magnify teacher impact and personalise student learning.

The platform provides 1,000+ Victorian Curriculum-aligned mathematics lessons developed for Year 7-10 students. Based on the mastery model, lessons explicitly teach students a concept or skill and require them to complete a series of questions, gaining mastery in that topic. Each year level builds in complexity starting with 'Core Concepts'; summarising key knowledge and skills required to begin each topic, then moving the students into work at a difficulty level aligned with that level.

Teachers quickly and easily differentiate their class by selecting from an extensive collection of pre-developed questions to assess individual students or the whole class. Assessments are automatically marked and provide the teacher a snapshot of each student's level of ability and an overview of the class' strengths and weaknesses. Remediation tasks can be recommended and automatically assigned. Welcome to bring laptop and be logged on to EP during the session, but not essential.

C17 Utilising codable robotic devices in primary mathematics classrooms

F - Y6, Repeat, Workshop
Max Stephens and Duncan Symons, The University of Melbourne

Student-friendly robotic devices such as BeeBot, Ozobot and Sphero introduce young students to systematic thinking to solve problems using a sequence of steps and decisions. The goal is to teach students that multiple starting points are possible, and that solution steps can be reviewed, revised and improved by class discussion. This session will show how these digital technologies fit readily with key content areas of the Victorian primary mathematics curriculum, and connect directly with Critical and Creative Thinking. They provide opportunities to demonstrate and explore algorithmic thinking, providing a natural bridge to visual-programming languages such as Scratch. This session will be interactive and will illustrate practical approaches to utilising robots in the primary classroom. Resources will be provided to illustrate the key goals for mathematical thinking from early childhood and Prep through to Year 6 with specific reference to the Victorian Curriculum: Mathematics. You may bring your own robotic devices and any resources you have found helpful.

C18 Graphics calculator programming for dummies

Y7 - Y12, Workshop
Tim Grabovszky, The Hutchins School, Hobart

This hands-on workshop will show you the basics of programming on the TI-Nspire CAS graphics calculator. It assumes no prior knowledge of programming and is aimed at people wanting to start out and learn some STEM skills to take back to the classroom. We will examine some simple programs and discover how easy and enjoyable programming can be. Often when students see how simple programming can be, it makes them want to do more. We will even program a robotic car to follow a certain path. Please bring a TI-Nspire CAS calculator. If you don't have one, some will be available for use.

C19 Algorithms for partial fractions

Y10 - Y12, Repeat, Workshop
Steve Hu, Eltham College

There are some traditional methods to resolve proper fractions into a sum of partial fractions. Finding the coefficients relies on solving a set of simultaneous equations in the traditional methods. The process of solving the set of simultaneous equations often involves very complicated calculations. This presentation will provide alternative ways to quickly resolve partial fractions for a few types of algebraic fractions. More general forms of algebraic fractions can be reduced to those forms.

C20 A binomial probability bonanza!

Y11 - Y12, Workshop
Russell Brown, Education Consultant
James Mott, Suzanne Cory High School

A hands-on session exploring a multitude of binomial probability concepts using the functionality of the TI-Nspire CAS. Start with the basics of solving standard binomial problems. Plot static binomial probability distributions then try your hand at animating a dynamic binomial probability distribution with changing number of trials (n) and probability of a success (p) using sliders for the variables and finally adding the functionality of the animation tool. Examine different approaches to solving all types of inverse binomial examples including the minimum number of trials given cumulative probability, probability of a success and number of successful outcomes using the latest built-in commands as well a more traditional calculator techniques. TI-Nspire CAS handhelds will be provided or bring your own.

C21 Reciprocal teaching in mathematics

Y5 - Y10, Repeat, Lecture
Thao Huynh and Alex Mills, Sunshine College

Reciprocal teaching is an effective strategy to help students to decode worded mathematics problems. This is a literacy strategy to build comprehension which has been modified to maximise its effect in the specialized field of maths problem solving. We will describe how the strategy works, give you a students' eye view of the process and share some resources for you to trial the strategy in your own classes.

C22 GeoGebra in the classroom - building conceptual understanding

Y8 - Y11, Repeat, Workshop
Danijela Draskovic, The Mathematical Association of Victoria

This is a beginner's introductory workshop on the free software, GeoGebra. In this workshop participants will explore the use of GeoGebra as a tool for supporting a visual and interactive mathematics pedagogy that emphasises conceptual understanding rather than procedural. Participants will be shown a demonstration of how GeoGebra can be utilised in the classroom when teaching quadratic transformations, trigonometry and the unit xircle, Pythagoras' Theorem and geometry. It will also include some ways teachers can enhance student understanding by using pre-programmed applets within GeoGebra, as well as involving students in the creation process by getting them to create their own GeoGebra files. The skills learnt in this presentation can be applied to most secondary year levels. Participants will be required to install GeoGebra to their laptop devices before the workshop begins.

C23 Fractionally more interesting than pizzas and pies

Y3 - Y8, Repeat, Workshop
Helen Booth, Australian Mathematical Sciences Institute (AMSI)

Gaining a solid conceptual understanding of fractions is hard. It requires children to recognise that many properties of whole numbers are not true of numbers in general and to think about how numbers relate to each other rather than principally use additive thinking strategies. By the end of primary school, it is assumed that they will have the mathematical maturity to engage in proportional reasoning allowing them to access more advanced mathematics. Yet so many of our students struggle to conceptually understand fractions and fail to make the jump into intermediate or advanced mathematics.

This workshop looks at way to build conceptual knowledge using physical and visual models so that students have a deeper understanding what fractions are, how to use them and their relationship to multiplication and division.

C24 What's fair about the fair?

Y5 - Y10, Commercial, Lecture
Thomas Moore, The Mathematical Association of Victoria, Daniel Bunworth and Mark Gleeson, Lumen Christi

A new up and coming MAV student activity in which we run probability based games to demonstrate to students the perils of gambling. These games are designed by students for the purpose of exploring chance. Come along and see how to get this up and running at your school and how to enrol your students in the MAVFair for 2019.

C25 Maths is allowed to make sense

Y7 - Y10, Lecture
Peter Collins, Dandenong High School

Session is designed for inexperienced maths teachers struggling with the idea of how to go effectively about teaching/planning a maths unit or part thereof. The example I shall base my presentation around will be a Year 9 Pythagoras / Trigonometry unit. (All resources will be available to be shared). The key points will involve identifying key ideas, structuring the learning effectively, and assessment. The presenter is an experienced teacher with mixed ability groups in state high schools, who has presented at the MAV conference before, and gained generally polite feedback. He is presenting this because he believes it to be useful. Please bring notepaper, pen and questions.

C26 Are you struggling to engage middle school students in the maths classroom?

Y4 - Y9, Lecture
Adam Kruger, Wesley College
Scott Rumble, Parkdale Secondary College

Students learn best when they are motivated to learn by seeing the value and importance of the information presented. This presentation will exhibit our STAR approach to learning. It is a 7-10 secondary mathematics program, which we developed at our college and are now working with a number schools to implement this exciting approach to learning mathematics. Throughout the session we will demonstrate how we motivate students to learning, create an interactive atmosphere to allow for student voice, build connections through directed assessments, provide

SESSION C, Thursday, 12.10pm-1.10pm (cont.)

opportunities to apply knowledge to real world situations, challenge and engage students through effective feedback strategies and work through using data as a tool to improve key numeracy skills of our students. By the end of the session, each attendee will walk away with engaging activities, strategies that they can use immediately in their classroom. Please bring laptop, pen and paper.

C27 Mathematics achievement by Indigenous children: LSIC and PAT maths

F - Y8, Lecture
Jim Spithill, Australian Council for Educational Research
Fiona Skelton, National Centre for Longitudinal Data (Department of Social Services)

Footprints in Time: The Longitudinal Study of Indigenous Children (LSIC) is a national study of Aboriginal and Torres Strait Islander children living across urban, regional and remote areas. LSIC is administered by the Australian Department of Social Services. The study is in its eleventh year. Indigenous interviewers visit families to talk with parents, carers, teachers and the children themselves. The study collects information about health and well-being, identity, cultural engagement, language use, major life events and school engagement. We outline some preliminary findings about mathematics achievement in relation to the student's social, cultural and environmental contexts. We also look at data about question types where Indigenous students perform well relative to the PAT Maths norms. Further research opportunities for using the LSIC data are discussed.

C28 HITS for improving student outcomes

Y3 - Y10, Repeat, Workshop
Michelle de Boer and Simone Hargrave, Scoresby Secondary College

This is a hands-on workshop which aims to provide teachers a wide range of high impact teaching strategies and activities for teachers to use in their own classrooms. This workshop will demonstrate how teachers can engage students with hooks, hands-on activities and differentiated tasks. A focus on the growth mindset is incorporated into the presentation. The importance of modelling and discussion will be a feature of this workshop. You will walk away with a deeper understanding of high impact teaching strategies that will increase student outcomes in numeracy and mathematics. Join us for this interactive workshop!

C29 Mathematician Monday: the story behind the numbers

Y7 - Y10, Repeat, Lecture
Ryan Martini, Yarram Secondary College

Through the exploration of a different mathematician each Monday, students are introduced to the wacky and wild characters that have created and discovered the principles and concepts that every student learns today. From the Pythagorean who was thrown off a boat for believing in irrational numbers, to the brilliant 20-year-old who was shot for love, the story of mathematics is full of bold and daring personalities, as well as a large number of interesting discoveries to accompany them. In this presentation, we'll go through a number of slides dedicated to everyone from Florence Nightingale (funny pie charts) to Leonhard Euler (doodling with Euler's formula), and show how their stories, alongside related activities or formulae, can be used as a hook at the beginning of a week of mathematics.

C30 Visual strategies for fractions, decimals and percentages

Y3 - Y8, Repeat, Workshop
Christine Lenghaus, Huntingtower School

Seeing is believing. Stop telling, start showing.

The teaching visual strategies to students to enhance understanding of fractions, decimals and percentages workshop provides a systematic process and variety of visual strategies, focusing on matching visual and symbolic representations, which is the way any language is learned. The content is material I have used or developed in my classroom.

In this workshop, delegates will experience the powerful impact that learning via the use of visual techniques can have when teaching fractions, decimals and percentages in a maths classroom.

- Gain an understanding of how visual strategies work when teaching maths to students.
- The systematic, logical sequence to teaching fractions, decimals and percentages that builds on your student's knowledge.
- When to choose additive thinking, multiplicative thinking or proportional reasoning.
- How to progress from numbers to fractions, decimals and percentages using visual strategies.

C31 Creating assessment to inform your teaching

F - Y6, Workshop
Catherine Epstein, The Mathematical Association of Victoria, numeracy leader and independent consultant
Samantha Fleming, Glengala Primary School

In this workshop we will walk you through the process we go through to create an effective assessment by considering the big ideas and possibly the numeracy learning progressions in relation to the standards. We will then look at how we analyse this using a simple spreadsheet traffic light system to inform our teaching. (Please bring Ipads, chromebooks or laptops to possibly create an assessment and spreadsheet for your class).

C32 Design thinking for VCAL numeracy

Y10 - Y12, Repeat, Workshop
Kris Ellery and Leah Whiffin, Bendigo Senior Secondary College

In VCAL numeracy disengaged students are one of our biggest challenges. We know students can be disengaged for any number of reasons. One major reason is a lack of self belief which inhibits students from trying for fear of being 'wrong'. Design Thinking is a methodology that guides teachers into creating projects where students feel more confident to participate, take risks and incorporate other skills into their maths. Design Thinking projects don't have 'one right answer' and allow students to work at their own level.

In this session teachers will participate in a hands on activity in small groups while learning about the five stages of Design Thinking.

C33 Digital resources in action

Y8 - Y12, Repeat, Lecture
Ro Bairstow, King's College

Ro will discuss the impact that digital resources used on tablets (iPads) have had on learning and teaching in his secondary school mathematics classes at all levels. Student feedback and the effect on assessment will be shown.

He will demonstrate a range of resources, including eBooks, apps, websites and games that he has found useful, including some he has created himself (www.bestmaths.net). These resources stimulate interest and help to increase understanding across many of the topics included in most upper primary and secondary curricula. Many of the resources are available on all platforms and all of the resources he will show are free.

C34 How to do intervention well

F - Y9, Repeat, Workshop
Tierney Kennedy, Qld Association Mathematics Teachers

Kids can actually catch up, but it requires some thinking. In this workshop, teachers will identify costs, benefits and ways forward for the variety of intervention strategies most often used in primary schools. Tierney will also present brand new and highly practical research that show students from Years 3-6 growing more than 12 months more than department expectations for every year of teaching across multiple schools. More specifically, this research shows what to do when students display misconceptions during challenging tasks. It shows how to use questioning to get kids to change their own minds and abandon their misconceptions, as well as how to grow new understanding in a way that sticks (effect size of 0.7 above DECD expectations for PAT M each year).

C35 Modelling maths learning through team teaching

F - Y6, Workshop
Rebecca Stewart and Caitlin Faiman, Bialik College Hawthorn East

This presentation will describe a professional learning model involving a team of teachers following a fortnightly cycle of planning, team teaching and reflecting upon mathematics lessons. To illustrate this model, we will share challenging mathematics tasks presented to lower and middle primary students and consider strategies for differentiating and enacting these tasks. The session will also highlight the potential of this model to build teacher content knowledge and pedagogy in mathematics. Participants will leave with tried mathematical tasks and resources, as well as a framework to enact this model in their own school context.

C36 Algorithmic thinking and coding in the middle school

Y4 - Y9, , Workshop
Rose Humberstone and Christian Neeson, Trinity Grammar School, Kew

This year, Trinity Grammar School introduced a compulsory semester long subject on coding and algorithmic thinking at Year 7 and Year 8. In this talk, we will explore how we have actively taught algorithmic thinking and problem solving skills in a mixed ability class and how this connects to mathematics and coding in Python. An overview of the curriculum and some of the activities we have used will also be demonstrated.

SESSION C, Thursday, 12.10pm-1.10pm (cont.)

Our experience of teaching students coding in Python will be shared and how we have assessed students' development. We'll also be highlighting some of the things we've learnt in developing and delivering a new program of this nature and how we hope to further develop the program in the future.

C37 Essential Maths, Cambridge Senior Maths and ICE-EM – A guide to Cambridge's online resources powered by HOTmaths

Y7 - Y12, Repeat, Commercial, Lecture
VJ Gunawardana, Cambridge University Press

HOTmaths is Australia's premier online resource to teach and learn mathematics. Cambridge has the newest editions of the Essential Mathematics series (7-10), the newest versions of Cambridge Senior Maths for Australian Curriculum/ VCE series (11-12) and the 3rd edition of the ICE-EM series onto the HOTmaths platform. This workshop will highlight how these new titles have been integrated with HOTmaths and demonstrate how to navigate through all three of these interactive resources. Learn how you can make the most of both the student resources and the learning management system for teachers. Whilst HOTmaths offers courses for Years F-10, this workshop will focus on secondary only.

C38 Innovation and inspiration: use of instructional videos to promote mathematics

Y3 - Y6, Workshop
Fiona Clarke, Mackellar Primary School

There is no doubt digital technology plays an integral part in enhancing student learning. This presentation will give you an insight into how multimedia instruction can be used to foster learning. It will make links to the research behind instructional videos and the key characteristics that make them a highly effective learning tool. This session also aims to share how instructional videos were introduced into a primary setting to support the teaching and learning of mathematics. It will highlight how instructional videos

- Encourage teachers to be more explicit in their teaching.
- Provide evidence of students mathematical skills and understandings.
- Build student confidence and provide a collaborative approach to learning.

Finally, participants will be given the opportunity to put 'theory into practice' and begin the production of an instructional video of their own.

Please note: Participants will be required to download the app 'explain everything' to a personal device and bring this along to the session.

C39 A matter of time

F - Y6, Repeat, Workshop
Margaret Thomas and Phil Clarkson, Australian Catholic University

There is more to the teaching and learning of time than the reading of clocks and calendars. For some students, time is a challenging concept. In my research I identified four major components of time that need to be understood, and the relationships between these components, for deep learning to take place. These components, presented in a framework for the learning and teaching of time, will be explained with practical examples given for teachers in the primary school. This session will also include an explanation of my assessment of students' understanding of time; discuss the question of analogue vs digital clocks; and suggest that there is a real need for some changes to be made to the curriculum at classroom, school and national levels.

C40 Worthwhile CAS calculator use in this year's second Methods exam

Y10 - Y12, Repeat, Workshop
Kevin McMenamin, Mentone Grammar

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 its workings. 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. Bring along your CAS calculator and a copy of the exam if available. Some Casio ClassPad calculators will be available for loan.

C41 4 arm shapes and other visual algebra experiences

Y5 - Y10, Workshop
Doug Williams, Mathematics Centre

4 Arm Shapes looks like a text book exercise but by approaching it as a mathematician might and drawing on best practice teaching craft, it becomes a challenge that introduces generalisation in words and symbols, substitution,

solution of equations, equivalent algebraic expressions and linear graphs in a concrete, visual manner that makes sense. If your students don't seem to 'get it' with a text-based approach to algebra, then building in more of these visual algebra experiences might make the difference. So might a menu-based approach offering choice to students and we will look at a couple of ways of doing this.

C42 Process over product: it's more than an equation

Y4 - Y9, Workshop Lorraine Day and Derek Hurrell, University of Notre Dame Australia

Developing number and algebra together provide opportunities for searching for patterns, conjecturing, justifying and generalising mathematical relationships. It allows the focus to be on the process of mathematics and noticing the structure of arithmetic, rather than the product of arriving at a correct idea. Two of the big ideas in mathematics are multiplicative thinking and algebraic reasoning. By noticing the structure of multiplicative situations, students will be in a position to reason algebraically and the process of reasoning algebraically will allow students to appreciate the value of thinking multiplicatively rather than additively. The aim of this hands-on workshop will be to link the two big ideas looking at how each enhances the study of the other. Participants will work through a range of tasks suitable for use in their classrooms and investigate how these tasks can assist teachers to encourage students to notice the underlying structure of mathematics.

C43 Boring, pointless and scary!

Y3 - Y9, Repeat, Commercial, Workshop
Andrew Lorimer-Derham, Think Square
Michael Briggs-Miller, Teach Of Australia

Sadly, these are some of the most common words our students associate with maths. This mindset (often inherited) creates enormous barriers to learning and enjoying mathematics. It's time to shift this thinking.

This hands-on workshop will showcase a range of engaging games and activities to increase your capacity to:

- Engage learners of any ability
- Build skills and confidence in your weaker learners
- Get students working together and thinking out loud
- Encourage curiosity and creative thinking
- Provide rich, challenging tasks with a low floor and high ceiling
- Foster a love of maths.

SESSION D, Thursday, 2.30pm-3.30pm

D1 Painless partitioning: developing proficiencies through games

Y2 - Y7, Workshop
David Dunstan, Association of Independent Schools of Western Australia
Paul Swan, Dr Paul Swan

Participants will focus on the partitions of 10:

- whilst playing the Italian card game called Scopa and
- when solving the 4 x 4 KenKen addition operation grid.

SCOPA is a game of singles for 2 or 3 players, or a 'team of 2' match for 4 players. In Italian, Scopa means 'broom'. In the game Scopa, you are awarded points for four specific actions and for 'sweeping' the last cards off the table.

KenKen offers a whole school approach for developing the proficiencies of Fluency, Problem Solving and Reasoning. In using arithmetic operations, multiple partitions, factorisations and deductive reasoning are actioned. While participating in both activities players will learn reasoning strategies. Support materials will be made available for teachers so they can try these ideas in their classrooms.

D2 Engaging students in Footy Maths

Y3 - Y10, Lecture
Richard Korbosky, Dapma Pty Ltd

This session on Football Maths involves students in looking at aspects of historical data or new real life happenings, solving real life maths problems, which could be novel or unfamiliar, interpreting data, making predictions and using tables to record the data and solve the problems presented. The community free footy maths worksheet activities are posted weekly/fortnightly with current up to date data and interesting social data on player and umpire statistics. This session will not ask participants to perform any calculations. Come along and see what is involved in Footy Maths so that in the future you have a strategy to engage your students in applied mathematics using real data. Laptop or smart phone needed to download information.

D3 Challenging tasks: inspiring ideas for transforming the early years classroom

F - Y3, Repeat, Workshop
Johnson Alagappan, Gilson College (Taylors Hill)
Sharyn Livy, Monash University

The early years of schooling is an exciting period in the cognitive development of a child. The concrete operational stage is marked by the onset of logical thought, inductive reasoning and understanding of conservation concepts. Do the mathematical tasks presented to young children match up to their cognitive abilities? In this research based workshop, we will explore how challenging mathematical tasks were presented in the early years, how enabling and extending prompts were created and what actions were taken to encourage persistence. Be involved and inspired by an exciting, transformative workshop that will surprise you with the abilities of young children. Take away concrete ideas for immediate application in your classroom. Bring an open mind and be prepared to be challenged!

D4 Maths Method adding value through team approach

Y10 - Y12, Repeat, Lecture
James Poon, Jimmy Drossos, Sabine Partington and Tom Christiansen, Carey Baptist Grammar School

The Carey approach to teaching Methods was identified as one that is welcomed by students and has shown significant value-adding in the VCAA analysis. Using technology, and in particular screen capture videos, the team has been working towards flipping lessons, differentiating curriculum, and building students' independence in their study. This team approach to teaching reaches out to all students of all abilities and leverages the strength of all team members - curriculum planning, differentiation, technology, and overall result analysis.

By customising this to our students they are more engaged and willing to learn. In this workshop, we would like to share our approach to teaching Methods and some of the videos, websites, worksheets, and notes that have contributed to our success.

D5 3D graphing and solids of revolution

VCE, Workshop
Sanjeev Meston, Lakeside College

This session will focus on using a combination of mathematical tools and graphing software including TI-nspire to understand the concept of volume formed by rotating a function in x-axis or y-axis and 3-D visual analysis /graphing of shapes so formed. You will need TI-Nspire software or hand held and/or FX-Graph software.

D6 Here comes the sun

Y5 - Y8, Workshop
Tim Byrne

The sun is the focus for this workshop, which combines the mathematics of sundials, sun trackers and other solar instruments. Participants make an equatorial sundial for their specific latitude and longitude; the simplest and easiest to understand. Participants learn how to generate and analyse data cast by shadows following the steady rotation of the earth. Some extensions relating to equinoxes, solstices, eclipses and sunspots. Some important historical sundials are illustrated and discussed. This is a hands on workshop.

D7 Preparing for Methods examinations – a video highlights package

Y11 - Y12, Repeat, Workshop
Alastair Lupton, Le Fevre High School

Preparing for the Mathematical Methods Examination 2 can be demanding – you need to know your mathematics as well as have some pretty decent skills, both with and without technology. In this session, we will dip into some revision resources presented via video. In an 'all killer, no filler' highlights package, we will look at sections of past exams (2016 and 2017 in particular) where technological demands were high, as well as sections where discerning selection of 'e-tech' and 'by-hand' techniques was called for. The revision resources feature Classpad use, as well as fully worked and explained 'by-hand' solutions. Bring your ClassPad if you want to play along, or just sit back and enjoy the show!

D8 ClassPad tips and tricks

Y10 - Y12, Workshop
Charlie Watson, The Tuition Centre

This hands-on workshop will explore useful features of ClassPad that are often overlooked by busy classroom teachers. From shift keys to sliders and statistics to sequence, we'll share tips on how to get the best out of all 17 of the standard apps. Participants are welcome to bring their own ClassPad and try out ideas as we go, but you may prefer to just sit back, take a few notes and try by yourself later. A small number of ClassPads may be available to borrow at the session.

D9 Hands-on maths for Prep - Year 2

F - Y2, Repeat, Workshop
Anna Kapnoullas, Top Ten Resources

This presentation will focus on practical examples of hands-on mathematics for Prep, Year 1 and Year 2. This includes:

- Early numeration using 3-dot dice, tens frames, bead slider number lines and LEGO.
- Subitising and partitioning using engaging lesson hooks and easy-to-find materials.
- Addition using addition machines, strategies to develop students' 10 and doubles facts, playing cards, dice and dominoes.
- Subtraction using numeracy picture books and students' real-life connections.

D10 Raising challenge through questioning

F - Y9, Repeat, Workshop
Leonie Anstey, Leonie Anstey Consulting (Keynote presenter)

This hands-on workshop will focus on teacher questioning techniques within learning tasks. You will develop skills and knowledge that will allow you to facilitate dialogue and discussion prompting deep understanding of mathematics concepts. These ideas will be explored through lessons highlighting differentiation allowing all students to make progress in their learning.

D11 Where do you get your ideas???

F - Y9, Repeat, Workshop
Jacinta Blencowe, Australian Mathematical Sciences Institute (AMSI)

When talking to teachers about problem solving and inquiry maths, one of the questions I get asked most often is 'Where do you get your ideas?'. This workshop looks at ideas and resources for open ended questions, inquiry maths, investigation maths and problem solving.

D12 Google forms - real time data to guide teaching

Y5 - Y10, Workshop
Shelley Pendlebury and Cassandra Zara, Woodleigh School

Learn to create a Google Form to: 1) Enable the collection and use of real time data to guide differentiated instruction 2) For the delivery of personalised learning content 3)

SESSION D, Thursday, 2.30pm-3.30pm (cont.)

Use Forms to critically evaluate practice. A workshop for beginners and novices using Google Forms. Participants will use Google Forms to create a quiz or learning activity for their own class. A laptop is required and participants need to have access to their own Google account.

D13 VCE Algorithmics HESS - introducing algorithmic thinking to students

Y7 - Y12, Repeat, Workshop
Georgia Gouros, Distance Education Centre Victoria

Teaching and lesson resources will be presented, and shared, on how to encourage students to apply logic, and mathematics to solve problems by creating algorithms. In this workshop we will look at activities to help encourage algorithmic and computational thinking and problem solving in our students. The aim is to enable students to be able to model the problem presented, and identify the variables, and parameters, and then construct logical and mathematical processes, and methods for finding the solution.

D14 Measuring a dampening effect, trigonometry meets the exponential

Y11 - Y12, Repeat, Workshop
Anthony Harradine, Potts-Baker Institute, Prince Alfred College

Using automotive shock absorbers as the stimulus, the motion of a spring will be dampened with various dampeners of differing severity; we will measure the effect of each dampener and then investigate how the dampening effect is related to the surface area of the dampener.

D15 Numeracy learning specialists: building excellence in teaching and learning

F - Y6, Workshop
Russell McCartney, Inverloch Primary School
Chris Terlich, Cowes Primary School

How do we build the capacity of teachers to maximise their impact and deepen students' mathematical understandings?

This session explores how numeracy learning specialists can lead purposeful, data-informed, collaborative inquiries focused on improving student learning outcomes. It provides an instructional model for highly effective mathematics teaching. We use a 'lesson study' model to support teachers to embed the high impact teaching strategies into their own practice. We also discuss how instructional leaders can support the teaching and learning of numeracy at their school by using these lesson studies to deepen teachers' mathematical content knowledge. We unpack the numeracy learning progressions as an effective tool for observing student learning, what can students currently do and what comes next?

D16 STEAM powered revolution or smoke and mirrors?

Y7 - Y10, Workshop
Peter Fox, Texas Instruments

How is your school dealing with STEM 2.0 otherwise known as STEAM? Is this just another acronym that will litter the corridors of educational history or will it genuinely revolutionise the way we teach? If STEAM is so important, why is it a subset of Mathematics, Technology, Art, ICT and Mathematics in the Australian Curriculum? Does combining mathematics and sciences classes solve the problem or create new ones? So many questions, so few solutions, so little time and even less access to professional development.

In this workshop we will explore some sample problems that can engage students in STEAM learning within the 'traditional' mathematics classroom and discuss STEAM solutions already implemented in some schools. Please feel welcome to share the experiences from your school during discussion.

D17 MAV students activities – enhancing problem solving and inquiry

F - Y12, VCAL, Commercial, Lecture
Helen Haralambous and Jennifer Bowden, The Mathematical Association of Victoria

The MAV has an outstanding student activities portfolio with a range of events, competitions and activities for students from Foundation to Year 12. In this presentation, we will share the various student activities offered by MAV together with the support offered. How do you start an investigation? How do you enter the MTQ? What is a MAV Games Day and how do I enter? Can I run one at my own school? I'd love to engage my school community in a Family Maths Night but don't know where to start? This workshop will be hands on, explore investigations and leave you wanting to inspire your students further.

D18 In search of the Euler Line

Y9 - Y11, Repeat, Workshop
Shane Dempsey, THAC
Raymond Rozen, RMIT

It was in 1765 the Swiss mathematician Leonard Euler proved that the centroid of a triangle trisects the line segment joining

its circumcentre to its orthocentre. Thus the circumcentre, the centroid, and the orthocentre are collinear and form the Euler line of a triangle. The geometry features of the CAS lend themselves nicely to an investigation of the Euler line of a triangle. Starting with pen and paper, then progressing quickly to technology, this activity incorporates many aspects of coordinate geometry. No previous CAS knowledge is essential for attendees. (Bring your TI-Nspire or borrow one provided.)

D19 (PBL + STEM) x space + games = fun

F - Y9, Repeat, Workshop
Roxanne Levett and Natalie Schilov, Moreland Primary School

Explore student created video games based on STEM subjects. Created using CoSpaces or UnReal Engine, students were asked to teach about space by designing and coding their own game or simulation.

Learn how science, technology, engineering and maths were taught and used throughout the project and how students can articulate their knowledge in order to exhibit their final product.

View and play student designed games. A device with Steam game platform installed.

D20 Increasing student achievement by enhancing teacher confidence: research and practice

F - Y6, Lecture
Ellen Corovic, The Mathematical Association of Victoria

In this workshop, Ellen will share with participants insights into her research and into her role as a mathematics education consultant. She will share with you why teacher confidence (efficacy) is key to enhancing student learning outcomes. The constructs of teacher efficacy will be explored and how each of these may apply to your school. Ideas on how to enhance teacher beliefs in themselves will be explored from a research and personal experience view. This session aims to enhance leaders understanding about the role teachers beliefs play in enhancing student outcomes as well as providing some practical approaches that can be utilised in school.

D21 Being the third donkey

Y7 - Y11, Workshop
Linda Shardlow, St Margaret's and Berwick Grammar School

A video shows three donkeys leaving their enclosure. The first takes a leap and jumps over a barrier, the second follows the first's lead and does the same. The third donkey looks at the barrier, walks to one end of it, lifts the barrier so it falls to the ground then calmly walks over it and out. How much of our teaching is like the first two donkeys – following the lead of either the chosen text or what was done last year? Can we do it better? How can teachers think more critically about the 'why' behind the 'what' of the content? How can students see the relationships behind the skills? This workshop will explore ways in which we can identify essential concepts in a topic and then engage students in learning activities that compel them to think more about these and link to other topics in the mathematics content.

D22 It's hailing numbers

Y4 - Y9, Repeat, Workshop
Katherine Seaton, La Trobe University

Odd numbers, even numbers, prime numbers and even the Fibonacci sequence - your students probably know all of them. But what about the hailstone sequences? Come and find a variety of low-threshold-high-ceiling ways to explore them: in words, games, lists, images, graphs, metaphor, equations, and even cartoons and colouring sheets. If your students think that all of maths is known, then the Collatz Conjecture may be just what you need to open their eyes.

D23 Algebra and geometry of complex numbers using TI-Nspire

Y11 - Y12, Workshop
James Mott, Suzanne Cory High School
Russell Brown, Educational Consultant

In this workshop we will explore how to plot complex numbers using the TI-Nspire, and dynamically explore the geometry of addition/subtraction complex numbers, and multiplication/division of complex numbers, which includes multiplying by powers of i. Alongside this, the behaviour of the magnitude and argument of the complex numbers will be explore, which then sets up a geometric explanation for De Moivre's theorem. If time permits, we will also explore how to plot subsets of the complex plane using TI-Nspire, and apply these techniques to past VCAA questions. TI-NSpire CAS handhelds will be available, or feel free to bring your own laptop or handheld. TI-NSpire CAS handhelds will be available, or feel free to bring your own laptop or handheld.

SESSION D, Thursday, 2.30pm-3.30pm (cont.)

D24 Active geometry learning in secondary school classrooms using MATHOMAT V2

Y4 - Y12, Commercial, Workshop
John Lawton, Objective Learning Materials

As an action-based learning tool Mathomat can deepen student understanding of most of the secondary mathematics curriculum. This session gives an overview of the new V2 Mathomat template and student manual through the following visualisation strategies; Replacing shape prototypes with analytical thinking, understanding what angles are when measuring them, construction of a unit circle-based sine function for solving trigonometry problems and use of Mathomat number lines to make mental calculations visible. We introduce activities that define transformations as isometries of the plane and the concept of using symmetry groups to unpack all possible symmetry operations in Mathomat.

D25 Capturing the spirit of a Year 12 Methods investigation

Y11 - Y12, Repeat, Lecture
Mark Oudshoorn and Zoë Carolan, Wantirna College

Like us, you may have had difficulty constructing an investigation that you felt met the requirements for the major analysis SAC task in Unit 3 Methods, but was also accessible to students of varying abilities.

In this session we will show you how we used a range of resources made available by VCAA and old CAT tasks from the 1990s to develop a unique and challenging mathematical investigation, that we believe captured the spirit of the intentions documented in the current study design. Students used a combination of CAS technology and DESMOS graphing software to accompany their investigation. We will share our SAC as well as some of the preparatory tasks. Please bring a laptop and CAS calculator.

D26 Problem solving: what did you learn?

Y4 - Y9, Lecture
Pumadevi Sivasubramaniam, Teacher Training Institute Malaysia Raja Melewar Campus

Problem solving has a special importance in the learning of mathematics. Research on mathematical problem solving focuses on analysing the extent to which problem solving activities play a crucial role in learners' understanding and use of prior mathematical knowledge. Mathematical problems are central in providing practice in applying mathematical knowledge to foster students learning. Hence, what students learn from the experience of solving mathematical problems should be given emphasis. In this study, recreational problems, better known as mathematical puzzles were used to explore what pre-service teachers learnt from their experience of solving them. The study used a survey design with open response questions to collect data. The data obtained from this survey was then used to outline a series of questions for future instructions when using these puzzles that would guide the individual to explore the underlying rules to solve the puzzles rather than merely solving them.

D27 Fun and games in VCE maths

Y10 - Y12, Repeat, Workshop
Rosalind Willsher and Sharon Darling, St Augustine's College, Kyabram

The VCE maths studies are all very full and there's not a lot of spare time as we all struggle to complete our courses. However, this doesn't mean there isn't time for a little fun along the way, as long as we are learning as we play!

In this session we will share some of the fun we have and the games we play in our classes as we tune into lessons, consolidate new ideas, break up long double periods and cater for our hands-on and active learners. Whether you teach Year 11 General or Year 12 Specialist, fun is always good.

D28 Teaching with Algebra Tiles

Y6 - Y10, Commercial, Workshop
Michael O'Reilly and Norrian Rundle, Norrian Michael Maths Education

'Algebra Tiles' are a hands-on teaching aid used to introduce and teach middle years students the four operations using integers, as well as simplification, expansion and factorisation of linear and quadratic expressions. Teaching strategies will be explained throughout the session. We will also provide templates to cheaply make your own sets of 'Algebra Tiles'. Although this is a commercial session, the ideas and teaching strategies covered in this session can be implemented in your classroom without purchasing 'Teaching with Algebra Tiles'. 'Teaching with Algebra Tiles' is published by the presenters. Bring along a USB stick for take home resources.

D29 Essential Assessment – Victorian Curriculum assessment and curriculum made easy

F - Y10, Repeat, Commercial, Lecture
Andrew Spitty, Essential Assessment

Essential Assessment provides an easy and affordable way for Victorian primary and secondary schools to deliver

a consistent and whole school approach to Victorian Curriculum numeracy and literacy assessment and curriculum. Essential Assessment delivers a whole school approach to summative and formative assessment and delivers a online differentiated assessment and curriculum model aligned to the content descriptions of the Victorian Curriculum. Our online assessment program assesses and develops student knowledge within each proficiency standard while delivering a consistent approach to whole school data. Our online platform creates a differentiated online curriculum to progress each students understanding within each strand, sub-strand and topic of the Victorian Curriculum!

D30 Demystifying surds - an alternative approach!

Y4 - Y12, Repeat, Workshop
Greg Sheridan, The Scots School Albury

Surds are traditionally a topic that students learn by rote rather than through a clear understanding. Unfortunately, how they are manipulated and their link to algebra is often missed. This workshop aims to reverse this paradigm by taking a quick look at the history of irrational numbers and their evolution. Participants will then use Pythagoras, number line activities and algebra to look at surds from a different perspective. Upon leaving you will have a great set of lessons to introduce surds with meaning. Prior to coming, ask your students to draw a number line and mark where the square root of two and three lie respectively on this number line (do not give any hints or allow the use of a calculator). Bring a sample of the the results with you for discussion.

D31 Activities for exploring maths concepts

Y7 - Y10, Repeat, Commercial, Workshop
Vanessa Rule-Paddle and Julian Lumb, Pearson

This is a practical session in which you will have the opportunity to engage with and explore activities that are designed to support students to develop and practice reasoning and critical thinking skills. The activities are designed to allow students to 'play' with mathematics by exploring concepts through discussion, using multiple approaches and strategies, by justifying their thinking and by reflecting on their learning. It will also explore how simple and effective use of technology can give immediate feedback, deepen conceptual understanding and make mathematics come to life for learners. While this session is suitable for Years 7-10 mathematics, the pedagogy explored is applicable to other year levels.

D32 Digital resources in action

Y8 - Y12, Repeat, Lecture
Ro Bairstow, King's College

Ro will discuss the impact that digital resources used on tablets (iPads) have had on learning and teaching in his secondary school mathematics classes at all levels. Student feedback and the effect on assessment will be shown.

He will demonstrate a range of resources, including eBooks, apps, websites and games that he has found useful, including some he has created himself (www.bestmaths.net). These resources stimulate interest and help to increase understanding across many of the topics included in most upper primary and secondary curricula. Many of the resources are available on all platforms and all of the resources he will show are free.

D33 Developing classroom norms to enhance student mathematical reasoning

F - Y6, Workshop
Wanty Widjaja, Deakin University
Jennifer Churcher, Thomas Mitchell Primary School

Teacher actions to elicit and support students' justification and the value of making their reasoning explicit are vital. In this workshop, participants will have the opportunity to examine the processes involved in unpacking classroom norms such as depth over speed and the value of explaining and valuing diverse mathematical strategies and thinking. Evidence of students' written explanations and their discourse captured in the video clips will be presented. The presenters will share their reflection on establishing a productive partnership on evidence-based research into classroom practice.

D34 Rich task workshop

Y7 - Y10, Workshop
Stacy Thomas, Bayview College

In this hands-on session we'll dissect rich learning, to understand how to deliver powerful learning experiences through rich tasks. I'll discuss what makes a task rich, how to ensure it has multiple entry points, why I use them and share my resources. As a group we'll discuss ways that teachers can prepare for rich task lessons, to ensure that students are engaged throughout the activity. Rich tasks help promote students engagement and math confidence as well as problem solving and thinking skills. They can be used as quick openers or as extended tasks.

SESSION D, Thursday, 2.30pm-3.30pm (cont.)

We will also have the opportunity to work through a variety of rich tasks, and discuss how the task can be extended, as well as how teachers would apply it differently within their own classroom context. From this session, you'll get resources, strategies and the opportunity to learn from each others practices.

D35 Virtual reality - making all maths imaginary

Y5 - Y10, Repeat, Commercial, Workshop
Thomas Moore, EngageME Mathematics
Tony Vallance, Lilydale High School

We will explore a number of ways to use virtual reality within your maths class to engage your students. As well as the impact this has had when working with students from our school. These will range from using Vive headsets to cheaper and more cost effective methods such as Google cardboard in order to teach mathematics in an engaging way. Please bring along your phones.

D36 VCE Maths Methods - making your application task engaging

Y12, Workshop
Trevor Carter and Ian Wong, Waverley Christian College

This workshop entails our experiences in writing a Maths Methods Application Task with a meaningful context to students. Have you ever bought an externally prepared Application Task and found it to be beyond the grasp or life-experience of your Year 12 class ? Trying to adapt the task can also provide a challenge. Having faced this obstacle on numerous occasions, we decided to make our own Application Task to prepare students for the style and rigour of the VCAA Maths Methods Examination 2, as well as provide a context that students would 'enjoy solving'. In this workshop, our experiences in writing and delivering the Application Task will be discussed as well as providing a sample task for use in your school. A CAS calculator or graphing software is recommended.

D37 Transition from fully differentiated to VCE

Y9 - Y11, Repeat, Lecture
Jenny Sutton, Lavalla Catholic College Traralgon

The challenge for schools delivering a fully differentiated mathematics program, using tools such as Maths Pathway, is the transition to VCE. Lavalla Catholic College has been using this learning model since 2014 and has developed a Year 10 program that allows students to transition to the requirements of VCE mathematics. In this session, Jenny will share her experiences and give the opportunity for discussion.

D38 Developing Further Mathematics SAC tasks

Y10 - Y12, Workshop
Kevin McMenamin, Mentone Grammar

The mathematics study design 2016 – 2020 requires an openness and explorative approach to developing SAC material that ensures the tasks are application, modelling or problem-solving in nature and not just an extended collection of Examination 2 questions. This session gives you the opportunity to explore starting points and create the skeletal detail for the tasks you would use in 2019. We will look at a selection of application and modelling/problem solving starting points that will act as stimulus material to initiate discussion and then provide the focus of the investigations.

D39 HITing up the maths classroom: improving student outcomes with HITS

Y7 - Y12, Repeat, Workshop
Geetha Rangarajan and David Chew, Wellington Secondary College

The DEECD has introduced High Impact Teaching Strategies (HITS) as an effective way of improving student outcomes. This workshop provides hands on activities that utilise different aspects of HITS. The participants will be given opportunities to understand what HITS are and how they can use simple activities to promote deeper thinking among their students and thus improve student outcomes. Please bring your computers.

D40 Using problem solving to create differentiated learning experiences

Y5 - Y8, Repeat, Commercial, Workshop
Pauline Kohlhoff and Anne Prescott, Australasian Problem Solving Mathematical Olympiads (APSMO) Inc.

In this workshop, we will explore how a well constructed problem can be used for teaching students who are at different stages of mathematical development, and who may exhibit different levels of mathematical achievement and confidence in their own abilities.

Questions from the Australasian Problem Solving Mathematical Olympiads and Maths Games will be used as the basis for classroom activities for students in Years 5 to 8.

The aim is to support a variety of solution strategies and further mathematical inquiry, to enhance differentiation in the teaching and learning of mathematical concepts.

APSMO Inc. is a not for profit organisation. This session is open to all teachers with an interest in problem solving. Participation in APSMO programs is not assumed.

D41 Working mathematically with infants

F - Y2, Workshop
Doug Williams, Mathematics Centre

Children learn more and teachers love it. Developed by teachers who are engineering their classrooms to enhance children's number sense, working mathematically with infants splices threaded activities from calculating changes with investigations adapted from Mathematics Task Centre and Maths300. Access to Maths300 is not necessary, but enriches if available. Threading is a teaching technique using rich, differentiated activities for small amounts of time often. The workshop introduces sample activities and investigations and the planning model teachers have developed to implement them. Mathematical conversation and learning in community - whole class and small groups - are key features.

D42 Making 'we just don't know' accessible and beautiful

Y7 - Y12, Repeat, Lecture
Andrew Crisp, Mathspace

Mathematics can sometimes feel set, like concrete - questions have an unambiguous, well-known answer, and have been answered by legions of students before them, each chasing the tick and fearing the cross.

The unsolved areas of mathematics are not all high up the ivory towers of expert, career mathematics. The frontier, where the best anyone can say is 'we just don't know', is often right beneath our feet!

This talk will present a rationale (with examples and advice) for introducing unsolved problems in your high school classroom. From moving a sofa around a corner to Goldbach, four fours to Collatz, the enormity of large numbers, and more. These problems possess a unique ability to inspire exploration and creativity in students, solidify understanding throughout the curriculum as a whole, while teaching them (and you!) the power, the limits, and the beauty of mathematics.

D43 Mathematica case-study, Year 9 Melbourne Girls Grammar

F - Y12, Repeat, Workshop
Ian Willson, Independent teacher/consultant
Faina Brichko, Melbourne Girls Grammar

Participants in this workshop will be shown some of the work done in semester 1 this year at MGGS, where Year 9 students embarked on a series of collaborative activities in the use of Mathematica and the Wolfram Language—with a focus on linear relations.

You will see how students were presented with challenge and discovery tasks with little or no previous experience with the software. A subsequent student project will be discussed, with a focus on both easily managed and more difficult ideas, concepts and Wolfram Language functionality. You can expect to take away ideas, activities and tools for use in your own classroom, and some reflection on matters to do with the introduction of Mathematica/Wolfram Language as a CAS technology tool.

For most effective participation a laptop with Mathematica software already loaded is desirable (no computer lab facilities are available).

SESSION D-E, Thursday, 2.30pm-4.40pm

D-E1 Inspiring Further Math students: recursion and financial maths

Y9 - Y12, Repeat , Double Session, Commercial, Lecture
Craig Bauling, Wolfram Research

Craig Bauling will present on using Mathematica for Further Mathematics core recursion and financial modelling. He will provide functionality and sample solutions to a range of past exam questions, showing how Wolfram|Alpha and Mathematica (tools freely available to all Victoria students and teachers) can be used to inspire and engage your teaching. You should come prepared with Mathematica loaded onto your computers, instructions at: www.education.vic.gov.au/about/programs/learningdev/vicstem/Pages/wolframsoftware.aspx.

D-E2 Real-world data analysis using Google sheets

Y10 - Y12, Repeat , Double Session, Workshop
Nazim Khan, St Mary MacKillop College

Google Sheets and real-world data will be utilised to demonstrate the concepts in univariate, bivariate and time series data analysis. This will allow an opportunity for participants to explore the real-world applications of the concepts covered in Years 11 and 12.

Key concepts include:

- Construction of dot plots, stem plots, bar charts, histograms, and box plots.

Construction of scatter plots (with line of best fit and least squares regression equation), residual plot, normal probability plot, two-way frequency table, segmented bar chart, and parallel boxplots. Calculations of correlation coefficient, and coefficient of determination.

- Calculation of measures of centre, spread, and 95% CI.

Construction of time-series plot, smooth time series data by using a simple moving average, calculate seasonal indices by using the average percentage method, deseasonalise a time series by using a seasonal index, fit a least-squares line to model long-term trends in time series data. Participants to bring along a laptop or any device that can access Google Sheets. Laptops will be convenient to work with.

D-E3 Enrichment tasks for high performing students

Y7 - Y10, Repeat , Double Session, Workshop
Donna Callow and Jim Rizos, Glen Waverley Secondary College

We will explore some interesting enrichment tasks and problems suitable for high performing students at Years 8 and 9, though could be adapted to other year levels. These have been used in our enrichment classes to help students to think mathematically and to introduce them to areas of maths not normally encountered in mainstream classes. Some discussion of how to create these tasks will take place.

An evidence-based mathematics Learning and Teaching Model

- Diagnostics
- Personalised content
- Multimodal learning
- 1 — 1 feedback
- Data-driven reports
- Targeted small group instruction

mathspathway.com

MATHS PATHWAY

Giving teachers the tools, time and professional development so they can focus on high-impact teaching strategies.

SESSION E, Thursday, 3.40pm-4.40pm

E1 Bring industry and student interest to maths

Y4 - Y9, Workshop
Felicity Furey, Machinam
Adam Kruger, Wesley College

Is it possible to combine both future careers and student interest while teaching the maths curriculum? It can be a challenge to continue to create new, authentic, motivating and relevant problems for students. Can we be fresh and relevant for students and answer the age old question of 'why do I need to learn this?' in maths? This workshop combines Adam's extensive teaching experience, in particular how to incorporate student's interests, with Felicity's professional engineering background and understanding of the skills of the future, to show how maths can be brought to life for your students.

In the workshop you will

- Gain an industry perspective of maths and engineering
- See how you can bring the real world and student's worlds into maths
- Create your own lessons applying this framework
- Walk away with fresh ideas and perspectives to engage and hook your students.

E2 A critical analysis of the use of effect sizes to judge impact

Y7 - Y12, Repeat, Workshop
George Lilley, Box Hill Senior Secondary College
Marcel Van Otterdyk, Strathmore Secondary College

We will look at the various ways effect sizes are calculated and ranked. Specifically we will look at John Hattie's Visible Learning and the problems of comparing effect sizes from different studies. We will also look at the specific studies Hattie used to calculate effect sizes. In particular, we will look at the studies for worked examples, class size, reducing disruptive behaviour, self-report grades and welfare. We will give delegates the option to decide which studies we use. We are sure you will be very surprised at what you find! We will provide electronic copies of the studies to view and read on your computer.

E3 Maths, magic and more

Y7 - Y10, Repeat, Workshop
Stephen Hanlon, Braemar College

Maths, Magic and More is the title of my Year 9/10 semester elective delivered this year at Braemar College. Focused on mathematical tricks using numbers and playing cards, and their links to topics that complement the curriculum; short cuts and alternative methods to improve by-hand numeracy and mental arithmetic; challenge questions and assignments to develop problem-solving and reasoning skills. In this session, I will elaborate on the program, demonstrate many of the tricks and explain the underlying mathematics. Come and see how you can easily incorporate some of these activities into your mathematics classroom. Needed, calculator and a sense of adventure.

E4 Mathematical games to promote the proficiencies

Y2 - Y6, Workshop
Catherine Attard, Western Sydney University

Games are often used as an 'add-on' in primary mathematics classrooms yet they can be a valuable resource to develop, practice and assess the proficiencies. In this hands-on workshop participants will explore a range of games that promote the Australian Curriculum: Mathematics proficiencies. Particular attention will be paid to teacher strategies for promoting mathematical communication and reasoning. Participants will also discuss how games can assist in promoting substantive cognitive, operative and affective engagement in mathematics.

E5 Turbocharge your ClassPad

Y10 - Y12, Repeat, Workshop
Charlie Watson, The Tuition Centre

This hands-on workshop is designed for teachers who want to help their more able students learn how to turbocharge their ClassPad with extra functionality. Starting with some very simple techniques in main and eActivity, we'll finish by learning basic skills to solve problems with the program app. Sound a bit nerdy? Maybe, but the focus will remain on applications of math to help you and your upper school students become highly efficient ClassPad users. Bring along your ClassPad and a reasonable working knowledge of it. A small number of ClassPads may be available to borrow at the session.

E6 Flexible numeracy learning in the primary setting

Y1 - Y6, Repeat, Workshop
Michael Gerber, Janis Mesiti and Craig Wiese, Truganina South Primary School

Whilst the foundational numerical concepts remain the same, the way in which the content is delivered to students is forever evolving. The learning needs within the classroom stretch further than they ever have. The need to differentiate to cater

for all students is paramount. The exploration of co-teaching, differentiation, open-ended tasks and elements of visible learning can assist in reclaiming the classroom and ensuring that all students are working at their point of need.

In this session, pedagogical coaches who have worked with teachers from Foundation to Year 6 will present ways they have used twenty-first century teaching and learning practices to develop teacher competency and improve student outcomes. You will hear examples of how teams of teachers and coaches have collaborated in planning and in the classroom to maximise the potential of a variety of co-teaching options and flexible student groupings.

E7 Minimising teacher planning time while improving student outcomes

Y7 - Y12, Repeat, Commercial, Workshop
Bill Murray, Mentone Girls Secondary College

The cloud-based Classroom Organiser topic/lesson planning and student tracking system will enable teachers to prepare every individual topic/lesson plan required for the year in a live document that can be updated in real time. The lesson plan will be accessible by teachers, students and parents in real time. The system will also track student progress in real time. Student assessments can be transferred to students and parents (using separate log-ins) within a few days of test completion. The system enhances student self-paced learning and encourages students to work through various levels of achievement. The system helps teachers to differentiate to meet individual student needs for consolidation or extension.
The system will:

- Minimise lesson planning time (this is a considerable time saving for teachers)
- Engage students constructively in planning and organising their work in a self paced manner.
- Enable teachers, students and parents to see student progress in REAL time. (Note that this is indicative and not prescriptive and does not involve a increasing teacher scrutiny of student work)
- Enable teachers and students to work collaboratively during a lesson to achieve the desired lesson outcomes to meet student needs. The lesson plans can be changed during a lesson and students will have access to these changes in real time.

The system is free to use, to download go to classroomorganiser.com.au.

E8 Jumping frogs game, algebra, graphing ... yes!!!

Y6 - Y9, Repeat, Workshop
Ian Bull, St Kevin's College

We all play video games, games using cards, games on the computer, games of chance of all sorts and of course within the games that we play there is a structure which underpins and powers each one. All games have a structure and the structure can be best described using mathematics in particular in the form of algebra and graphing. I have chosen a simple game to examine this called 'jumping frogs' where red and blue frogs need to change sides across a grid. This game opens up the mathematics that underpins it - pattern and linear and quadratic algebra. I will demonstrate what I presented to the boys at St Kevin's College.

E9 Learning place value through the lens of pattern

F - Y6, Workshop
Kristie Gibson and Melissa Sokol, Mount Scopus Memorial College

Mathematicians are pattern seekers. Maths is about making connections, not just learning topics in isolation. Being a mathematician is about knowing much more than 'the what'. It's about knowing why and how! It is important for learners to develop deep, mathematical conceptual understandings - solid foundations as a basis for more abstract mathematics. Using an inquiry approach to learning, this workshop will explore pattern as a foundation for understanding the base ten number system.

E10 UDFs and widgets in VCE Specialist Mathematics

Y12, Repeat, Commercial, Workshop
Chris Ireson, Melbourne High School and Texas Instruments T3 National Instructor

See how easily User Defined Functions (UDFs) and eidgets can be used on the TI-Nspire CX CAS Calculator to aid your students and save them time in the VCAA Specialist Mathematics Technology Active examination. You will be shown how to write your own UDFs and widgets and given some prepared ones to try for yourself. Please bring your TI-Nspire CX CAS Calculator.

E11 Teach Excel-ent maths

Y7 - Y9, Repeat, Workshop
Robert Money and John Widmer

The *Quantitative Skills in 21st Century Workplaces* Report identified 'a need to identify and take opportunities to embed

work-related technologies — particularly spreadsheets — across school curricula'. In response, we will discuss spreadsheet use in our Years 7 to 9 mathematics and the wider STEM implications. Examples range from the simplest 'Find My (Linear) Rule' activity to spreadsheet analysis of large 'real data' sets downloaded from data loggers. Bring your ideas to the session. Check out http://mag-net.org.au/mavcon/ for more detail. Prior familiarity with the Excel spreadsheet is NOT a pre-requisite for this session.

E12 Taking a look at formative assessment practices in primary school mathematics

F - Y4, Repeat, Workshop
Alex Box and Sam Collier, Maths Pathway

This session looks into current uses of formative assessment in primary school mathematics learning and the challenges of embedding formative assessment into everyday instruction in a sustainable manner. It will take a look at what the research says about formative assessment, its role in providing differentiated instruction and strategies for embedment into the curriculum. It will also consider the implications of a growing research and evidence base around how specific forms of assessment impact learner mindsets. Attention will turned towards how we are currently using assessment to inform differentiated mathematics instruction in Australian primary schools. What's currently working in schools? What challenges or roadblocks prevent ongoing, effective use of data to inform instruction? How do current practices reflect and fit with the research?

E13 In search of the Euler Line

Y9 - Y11, Repeat, Workshop
Shane Dempsey, THAC and Raymond Rozen, RMIT

It was in 1765 the Swiss mathematician Leonard Euler proved that the centroid of a triangle trisects the line segment joining its circumcentre to its orthocentre. Thus the circumcentre, the centroid, and the orthocentre are collinear and form the Euler line of a triangle. The geometry features of the CAS lend themselves nicely to an investigation of the Euler line of a triangle. Starting with pen and paper, then progressing quickly to technology, this activity incorporates many aspects of coordinate geometry. No previous CAS knowledge is essential for attendees. Bring your TI-Nspire or borrow one provided.

E14 (PBL + STEM) x space + games = fun

F - Y9, Repeat, Workshop
Roxanne Levett and Natalie Schilov, Moreland Primary School

Explore student created video games based on STEM subjects. Created using CoSpaces or UnReal Engine, students were asked to teach about space by designing and coding their own game or simulation.

Learn how science, technology, engineering and maths were taught and used throughout the project and how students can articulate their knowledge in order to exhibit their final product. View and play student designed games. A device with Steam game platform installed.

E15 Acquiring the habit of digital innovation

Y4 - Y9, Lecture
Daisy O'Bryan, The University of Melbourne

This presentation is based on the findings of a recently completed PhD study of mathematics teachers' use of digital technology in lessons. Using recent results of neuropsychology research, the study has found that the introduction of a digital innovation to a regular mathematics lesson gave rise to a cognitive conflict for some teachers of 'habit versus innovation'. The presentation will address the importance of understanding both habits and innovation to learning, and how these may be mediated to produce new learning outcomes for a digital world. Included in the presentation will be practical suggestions for developing teaching and learning strategies that promote the habit of innovation for teachers and students alike.

E16 Flipped learning in middle school maths

Y7 - Y10, Lecture
Andrew McAlindon, Catholic Regional College Caroline Springs and The University of Melbourne
Clara Cremona Millo, Catholic Regional College Caroline Springs

This option will present a brief overview of a technology-enabled flipped classroom approach within mathematics. The presenters will provide practical suggestions for how teachers may be able to incorporate a flipped approach within specific units of their mathematics curriculum, alongside how this can be used to gain meaningful and easy to analyse formative assessment information within each class. Using previously collected data, the presentation will highlight the impact that a flipped learning model can have on student results in middle school mathematics classrooms, from both student

and teacher perspectives. The intention of this session is to provide meaningful insights that can be integrated into your current mathematics curriculum.

E17 Creating an impact: sequence of challenging tasks

Y1 - Y7, Workshop
Sharyn Livy and Ann Downton, Monash University

Using a sequence of challenging tasks helps teachers to create an impact on their students' learning by enhancing their motivation, building their confidence, encouraging persistence and by extending their mathematical understandings. During this workshop, teachers will engage with important pedagogical approaches when exploring an example of a mathematical sequence of challenging tasks that caters for students in the primary and middle years.

E18 Creative and critical thinking at Camberwell High School

Y7 - Y10, Repeat, Lecture
Geoffrey Menon and Ursula Parker, Camberwell High School

A presentation in two parts. First part is about Year 9 mathematics where we use problem solving to begin with the end in view and present basic techniques (such as the Pythagorean theorem and trigonometry) as smaller parts in the solving of larger problems. The second part of the presentation covers the use of open-ended mathematical investigations in assessment in a Year 10 optional mathematics subject.

E19 Creating challenging problem solving tasks for all students

F - Y6, Repeat, Workshop
Michael Minas, Williamstown North Primary School

In this workshop, we explore how to plan and present challenging problem solving tasks that will engage all of your students, from the most reluctant to those who are extremely confident problem solvers. We will look at the ways in which the cognitive challenge for each individual student can be increased by outlining some simple steps that will help teachers write effective enabling and extending prompts. The factors that impact on engagement will also be discussed, with a focus on how challenging problems can be used to stimulate student motivation.

E20 Outcomes through games!!

Y2 - Y6, Repeat, Workshop
Peggy Ashton, Latrobe University

Games are a powerful tool in the teaching of mathematics. While students engage with mathematics in this enjoyable way, valuable assessment information can be recorded. In this workshop we will discuss the value of incorporating games into the maths teaching program. We will explore a selection of games that have been matched to the Victorian Curriculum, Number and Algebra content. A copy of all materials will be provided (USB).

E21 Creating impact by crashing robot cars - simultaneous rquations

Y9 - Y11, Commercial, Workshop
Brian Lannen, Wodonga Institute of TAFE

OK, we love the algebra of linear equations, and simultaneous brings things together in space and time. So let's calculate that space and drive a couple of robot cars into it. If nothing else, it should be fun!

TI-Innovator™ Rover was previewed at last year's MAV conference. Now it's in schools mobilising mathematics and providing an inexpensive, easy to use and well-supported STEM solution. Come along and see what all the excitement is about. This session is guaranteed to drive your imagination. Enjoy the ride! Bring your TI-Nspire calculator

E22 reSolve: maths by inquiry engaging classroom resources

Y7 - Y10, Commercial, Workshop
Helen Haralambous, The Mathematical Association of Victoria

reSolve: Maths by Inquiry provides free resources for teachers that provide opportunities to teach mathematics in an innovative and engaging way. In the workshop participants will explore and trial a sample of secondary maths classroom resources that encourage a spirit of inquiry. Participants are required to bring a laptop.

E23 Create an impact: classroom presentations and flipped videos

Y7 - Y12, Lecture
Dietmar Schaffner, Penleigh and Essendon Grammar School

This presentation aims to demonstrate how to make impactful classroom presentations and flipped videos using files

created in well-known apps like Word, PowerPoint and Adobe Acrobat in combination with CAS calculator emulators and newer presentation apps like Doceri and Notability. Particular emphasis will be placed on making videos to help students negotiate calculator active problems similar to those in the Maths Methods Exam 2. Since the presentation will be recorded for future reference, delegates can simply watch and learn or bring along their own devices and play along. Although the presentation uses Apple devices, the techniques and software used are available on Android and Windows devices as well. Although it is possible to attend this presentation without devices, it would benefit delegates to have an iPad and stylus, laptop and a lightning cable. The iOS apps being used include Doceri and Notability. The OS X software being used includes Screen Recorder Robot (Camtasia or Snagit would also work), Quicktime, Doceri Desktop and ClassPad Manager (TI-SmartView would work as well).

E24 Improving metacognition in your ma… classroom

F - Y6, Workshop
Paul Tuchtan, Balcombe Gramma…

As children progress through s… …can start to appear in their understanding of wh… …pen the way they do in mathematics. Through… …ctive teaching, students can explain what and … …e learning, why things are happening and… …t ways to solve problems. Metacognitive … …s been shown to have a positive impact on s… …dset enabling them to move beyond fixed thi… …their mathematical ability. This session will e… …ety of ways that teachers can incorporate me… …thinking into their classroom including key questi… …eachers can ask and activities to trial.

PRESENTER HAS CANCELLED WORKSHOP

E25 Creating impact on learning fractions and decimals

Y4 - Y8, Workshop
Anna Bock, Australian Mathematical Sciences Institute (AMSI)

Fractions and decimals are often viewed as complex concepts for students to learn and for teachers to teach. Using a range of manipulatives, rich open tasks and asking the right questions educators can support students in their struggle to conceptually understand these content areas and impact on their learning.

This session will explore research into the teaching and learning of fractions and decimals and how we can identify student misconceptions and address them. Participants will also have the opportunity to engage in rich open tasks which provide access to learning of these concepts for all students.

E26 Using reSolve (maths by inquiry) in the classroom

F - Y9, Workshop
Andrew Noordhoff and Jared Meredith, Jells Park Primary School

reSolve: Mathematics by Inquiry' is a national program that provides Australian teachers of Foundation to Year 10 with resources to teach mathematics in an innovative and engaging way. Resources are available free to all Australian students and teachers. The program is managed by the Australian Academy of Science in collaboration with the Australian Association of Mathematics Teachers. Andrew has been involved in the champions program to lead the implementation of reSolve at his school. Together with Jared they will show how some of the amazing resources have been used in their classrooms and what their students have taken away from the sessions. This will be a hands on sessions and participants will leave the session with lots of ideas on how to use reSolve in their classrooms.

E27 Topic starters

Y5 - Y10, Repeat, Workshop
Mike Clapper, Australian Mathematics Trust

Student disengagement from mathematics is an ongoing problem. This problem is significantly reduced if students are introduced to each topic in an engaging way which they can relate to their own experience and which justifies the acquisition of the technical skills required to make progress. This workshop will present a variety of well-proven topic starters but will also invite participants to present their own ideas, so it will be a sharing session.

E28 Transforming numeracy outcomes through effective multi sensory CRA methodologies

F - Y6, Repeat, Commercial, Workshop
Esther White, Evidence Based Education Resources Inc

Australia's falling numeracy results prove that an abstract approach to maths education is absolutely ineffective and does not meet the needs of primary students. Maths is a sequential subject that requires foundational understanding before a student can progress to life application and higher order problem solving. As such, it must be taught with progression from addition(subtraction) to multiplication (division) , fractions, then decimals and percents.

In this hands-on and interactive workshop, we will cover:

- a brief overview of the research behind this methodology and why it is essential for transforming numeracy outcomes.
- the benefits of a multi sensory approach for long term maths understanding, engagement, enjoyment and mastery

hands-on experience, of our 'Concrete - Graphic Representation - Abstract' methodology and the use of Math-U-See manipulatives as the basis of effective maths instruction throughout primary years.

E29 HITS for improving student outcomes

Y3 - Y10, Repeat, Workshop
Michelle de Boer and Simone Hargrave, Scoresby Secondary College

This is a hands-on workshop which aims to provide teachers a wide range of high impact teaching strategies and activities for teachers to use in their own classrooms. This workshop will demonstrate how teachers can engage students with hooks, hands-on activities and differentiated tasks. A focus on the growth mindset is incorporated into the presentation. The importance of modelling and discussion will be a feature of this workshop. You will walk away with a deeper understanding of high impact teaching strategies that will increase student outcomes in numeracy and mathematics. Join us for this interactive workshop!

E30 Creating individualised online homework

Y4 - Y12, Tertiary, Workshop
Thomas Wong and Jennifer Palisse, The University of Melbourne

Online survey forms not meeting your homework needs? Looking for something more individualised and sophisticated for your students?

In this session, we will be introducing and demonstrating a free online homework system called WebWork. WebWork contains a large freely accessible database of questions that allows you to generate, assign, and grade individualised homework for your students. Problems can be generated with randomised values to encourage collaboration of solution processes rather than direct answer sharing. Trial use of WebWork at the University of Melbourne has shown an increase in student engagement and persistence. Students have particularly enjoyed the instant feedback WebWork provides when attempting problems. Furthermore, WebWork provides teachers with a rich dataset about their students' progress such as number of incorrect attempts and success rate per question. You will have plenty of time to play and interact with the system.

WebWork is written in PERL and LaTeX. While programming experience in these languages is not essential, comfort with manipulating existing code is recommended.

E31 Archimedes: the maths entertainer

F - Y6, Commercial, Lecture
Patrick Collins, Felstead Education

If you are looking for something that is fun, entertaining and highly engaging for primary school maths learners then join Archimedes: The Amazing Maths Entertainer as he presents The Junior Maths Show.

Full of maths magic, history, puzzles, audience interaction, giant balloons and more, the Archimedes can help students to:

- Increase their enjoyment of maths
- Boost maths confidence and reduce maths anxiety
- Develop a growth mindset in maths
- Enhance problem solving skills
- Become more engaged with maths learning

During the highly interactive performance you will be roaring with laughter and thoroughly amazed by the power and wonder of numbers.

Don't miss this journey that can teach students about shape, space, measurement, estimation, problem solving, mathematical thinking and more while having a lot of fun and building a positive attitude to maths.

Simply come and have fun!

E32 What order should I teach topics in?

F - Y6, Repeat, Workshop
Tierney Kennedy, Qld Association Mathematics Teachers

Sometimes it seems that by the time we come to teach a new concept, kids have forgotten everything else! Some concepts are really important in maths, but others don't matter quite so much. In this session, teachers will consider all of the different content in maths that we usually teach in primary school, and will create a sequence starting from developing the concept of quantity in Prep all the way through to complex algebraic thinking in Year 6. Teachers will examine the connections

between related concepts, particularly linking concepts with key ideas in number. They will also consider the precursors for teaching each topic, what can be taught simultaneously, and what needs to come later in the year. Come along prepared to be actively involved, and bring a phone to take photos.

E33 Adusu Algebra: concrete materials for teaching algebra

Y7 - Y10, Repeat, Commercial, Workshop
Ruth Adusu, Adusu Algebra

Adusu Algebra is a concrete materials kit developed by full-time mathematics teacher Ruth Adusu who has 30 years of experience in the classroom. It allows students to physically build and manipulate expressions, equations and inequalities. By bringing algebra 'out of the abstract and into the physical' it avoids or eliminates common misunderstandings, provides immediate feedback, supports correct mathematical working, simplifies algebraic processes, allows student to explore questions, and improves recall. Differentiation in the classroom is also facilitated by the use of Adusu Algebra.

Participants will use a student kit to complete a variety of algebraic questions to experience for themselves the value of having a hands-on tool for algebra.

Attending this session will give teachers fresh insight into how students think about algebra and provide strategies to better equip their students to approach algebra with confidence, regardless of whether any products are purchased.

E34 Creating student buy-in for growth mindsets

Y4 - Y9, Workshop
Megan Steel, Kaniva College

During this session, attendees will pick up practical strategies to foster growth mindsets, and I'll demonstrate how these have been put into practice in my classroom. I will discuss the broader implications to the learning environment when a growth mindset culture is established effectively, and I'll share examples from my own practice as well as other success stories. When an appreciation of the diverse learning needs of students is baked into your teaching practice, students can focus on growth as a measure of success. Teaching strategies such as 1-to-1 feedback sessions, goal setting and student reflection have helped my classes develop growth mindsets, and take ownership of their learning.

E35 Using data science to change the world

Y7 - Y10, Workshop
Dianne Frost, Melbourne High School
Linda McIver, Australian Data Science Education Institute

The internet is awash in open data, and we can use real datasets to explore and change our world, learning maths as we go. This presentation will give examples of what data can do in the real world and show examples of students using real world datasets to learn data science, and essential maths skills such as graphing, data analysis and statistics. The presentation is suitable for teachers of Years 7 to 10 and aims to provide an alternative way of dealing with statistics within the mathematics curriculum.

E36 Making the connection: teaching big ideas and metacognition for examinations

Y7 - Y12, Lecture
Patricia Hosking, Queensland University of Technology and St Aidan's Anglican Girls' School

Queensland is preparing for external examinations from 2020 by combining lessons from other states with our existing focus on modelling and problem-solving. For students to pursue studies in mathematics we need to show them that it is meaningful, applicable and connected. We also need to teach effective study skills for students to be successful in an external testing environment. This presentation will share activities to make connections across topics using bar modelling and the unitary method, linear modelling and multiple representations. QUT's STEM for Schools run workshops integrating STEM fields so that students see the connections and how that applies in the real world. At St Aidan's Anglican Girls' School we have between a quarter and a third of students studying advanced mathematics, compared to seven percent nationally. Strategies for success include interleaving, retrieval and spacing effects. These study skills were trialled in an action research project addressing metacognitive monitoring.

E37 Engaging primary school students in mathematics through coding and robotics

F - Y6, Workshop
Jodie Miller, University of Queensland
Kevin Larkin, Griffith University

Engaging young learners in STEM practices such as robotics and coding gives students the opportunity to use new and emerging technologies to solve problems while extending their own knowledge and understanding of mathematics.

This session will draw on a research project that has been conducted with Year 2 - Year 5 students as they engage in robotics and coding to learn mathematics concepts related to measurement, space and patterning. Participants will have the opportunity to work with coding programs and trial tasks that were undertaken as part of the research. Personal device to access the website for the Scratch program - https://scratch.mit.edu.

E38 Essential Maths, Cambridge Senior Maths and ICE-EM – a guide to Cambridge's online resources powered by HOTmaths

Y7 - Y12, Repeat, Commercial, Lecture
VJ Gunawardana, Cambridge University Press

HOTmaths is Australia's premier online resource to teach and learn mathematics. Cambridge has the newest editions of the Essential Mathematics series (7-10), the newest versions of Cambridge Senior Maths for Australian Curriculum/VCE series (11-12) and the 3rd edition of the ICE-EM series onto the HOTmaths platform. This workshop will highlight how these new titles have been integrated with HOTmaths and demonstrate how to navigate through all 3 of these interactive resources. Learn how you can make the most of both the student resources and the Learning Management System for teachers. Whilst HOTmaths offers courses for Years F-10, this workshop will focus on secondary only.

E39 Implementing evidence-informed feedback processes in mathematics to improve students' learning

Y8 - Y12, Workshop
Tanya Vaughan, Evidence for Learning, Social Ventures Australia and Ollie Lovell, Sunshine College

Effective feedback practice can increase student progress by as much as an extra eight months over the course of a year. However, high quality feedback is often thought of as being synonymous with high teacher workload and schools investing significant time in research and external professional learning. To save teachers and schools this time and effort, the Australian Institute for Teaching and School Leadership, (AITSL) in partnership with Evidence for Learning (E4L), have developed a suite of feedback resources for schools. In this workshop, Tanya Vaughan from E4L will introduce these resources and Ollie Lovell, a senior mathematics team leader, will share some ways in which these resources can be practically applied in the teaching of secondary mathematics. This presentation will give practical ideas of how mathematics teachers can use free-to-access, evidence-based resources to utilise effective feedback practices and enhance student learning outcomes.

E40 Hands on pattern and algebra

F - Y6, Workshop
Catherine Epstein, The Mathematical Association of Victoria, numeracy leader and independent consultant
Mandi Mackey, St Peter's East Bentleigh

In this workshop we will explore a range of hands on resources to encourage algebraic thinking. Picture story books, dominoes, unifix and pattern blocks are all rich tools to explore Pattern and Algebra. So come and investigate how these resources can be explored and easily differentiated to help your children think algebraically.

E41 Engineering 'aha' moments in number

Y3 - Y7, Workshop
Doug Williams, Mathematics Centre

Calculating changes across the school when you stop thinking of something like 8 + 7 as an instruction to calculate and start thinking of it as an opportunity to investigate. Then the answer isn't 15; it's the variety of ways we can convince someone the answer is 15. This workshop offers an opportunity to experience such activities, consider the teaching craft involved and learn about web support from Calculating Changes. It will focus on Years 3 - 7 and is partner to the session 'Working mathematically with infants' which focuses on Years K - 2. You are welcome to either or both.

E42 From print to digital: our free maths textbook

Y3 - Y12, Repeat, Commercial, Lecture
Andrew Crisp, Mathspace

Are you planning to transition to digital resources? Mathspace has partnered with Westpac to make their online digital textbook, Mathspace Essentials, free for all Australian schools.

This is a comprehensive online resource which is mapped to the Victorian curriculum for Year 3 to 12. With thousands of topics and video lessons, as well as step-by-step support on practice questions, students can learn through interactivity for free.

This session is for anyone interested in learning how to use this free resource in the classroom. Andrew will take you through some great examples of content, including topics and investigations for offline classroom activities. Participants need no prior experience with Mathspace.

E43 Factors, composites and primes - what's the problem?

Y4 - Y9, Repeat, Lecture
Dianne Siemon, RMIT University

Many students who know their 'tables experience difficulty with factors, composites and primes. This is because a deep understanding of factors requires a significant shift in thinking from the equal groups or repeated addition idea that underpin the traditional 'times tables' to the 'scalar' idea for multiplication that instead of focusing on the number in each group, the scalar idea shifts the attention to the number of groups or multiplier. Factors, composites and primes are much more than a topic or chapter in a textbook to be considered once or twice a year. They require an extended understanding of multiplication that is not supported by the equal groups, repeated addition view of multiplication or the 'times tables'. An alternate way of developing the multiplication facts that supports the factor idea will be considered.

E44 Technology: classroom asset or distraction?

Y7 - Y12, Repeat, Lecture
Daniel Smorgon, Mathspace

Technology has transformative potential in the classroom, but many teachers are concerned that devices have become a distraction rather than a classroom lesson enhancer.

How can we capture the attention of easily distracted students when they're using devices?

In this session we explore what causes lapses in student motivation.

Study skills expert, Dan Smorgon, will share some simple strategies teachers can consider to improve the productivity of students whilst they use learning technology on devices in the classroom and at home. He will also give attendees a 'tools and strategies for staying focused online' kit to hand out to students.

SESSION DETAILS

FRIDAY
7 DECEMBER

SESSION F, Keynote, Friday, 9am-10am

F1 Developing mathematicians through problem solving

All Levels, Keynote, Lecture
Amie Albrecht, University of South Australia

Five years ago I designed a course to develop problem-solving skills in pre-service maths teachers at the University of South Australia. We focus on mathematical processes, not any particular branch of mathematics. We learn and practice strategies for: getting started; attacking the problem (e.g., specialising and generalising, being systematic, forming and justifying conjectures); and reflecting on and extending our work. Classes are centred around carefully-chosen puzzles and activities, paired with explicit coaching in mathematical processes, metacognition and collaborative learning. In short, I aim to: develop students' mathematical thinking skills so that they can tackle unfamiliar problems with confidence, help them experience the joy in asking and answering their own questions, and orient them towards the creative ways in which professional mathematicians like myself work.

In this session we'll look at the design and delivery of this course. We'll sample some good problems for uncovering aspects of problem-solving, and talk about specific strategies for progressively developing oral presentation and mathematical writing skills. We'll also tackle the thorny issue of assessment, including how to support students to undertake in-depth mathematical investigations of their own choosing. My goal is that you'll find one or two specific ideas that will help in your current teaching or, if you have the opportunity, to inspire you to design your own problem-solving course.

F2 The prerequisite for prosperity

All Levels, Keynote, Lecture
Alan Finkel, Australia's Chief Scientist

In the Age of the Algorithm, mastering the foundations in mathematics has never been more important. To grapple with coding, or engineering, or business development or smart design, you can't simply skip ahead: you need the scaffold of mathematics learned in sequence, in school. Yet mathematics has slipped from a prerequisite for university entry to a footnote in the prospectus, in course after course that depend on fluency in numbers – sending the wrong signal to principals and students. Too many university students are learning too late the reality that teachers have long understood. Mathematics is a prerequisite for success. It needs to be a priority in education – from day one. Australia's Chief Scientist Dr Alan Finkel reiterates the case for a national commitment to the expert teaching of challenging mathematics.

F3 STEM-focused engagement and impact: capacity building through nation-wide and localised learning programs

All Levels, Keynote, Lecture
Tom Lowrie, University of Canberra

The presentation outlines two professional learning programs that describe teacher impact across national and local programs. The first program, the Early Learning STEM Australia Pilot is a play-based learning program that includes a series of apps to explore STEM learning. The second program is a spatial reasoning intervention program implemented in primary- and secondary-school classrooms.

Both programs included the professional development of teachers however the approaches required differed, with two models of teacher engagement developed. The first model, a national model, for teacher engagement reflected the needs of a large group of teachers across geographically and contextually different areas of Australia. This approach for approximately 300 teachers across 100 preschool sites included delivery of resources, communications and a community of practice online as well as limited face-to-face professional development. The second model, a localised model, was able to include more input from classroom teachers in order to develop an intervention program that abreast of local contexts and needs. This model relied more heavily on face-to-face engagement and the reinforcement of established local learning communities.

Teachers will continue to develop understandings on:

Teacher impact in STEM-focused learning

- Building teacher capacity through learning programs
- Different models of professional learning
- Research and professional learning for improving practice.

F4 Leaving nothing to chance: Achieving impact through Best Practice in Mathematics Education

F - Y6, Keynote, Lecture
Tracey Muir, University of Tasmania

The quality of mathematics education in Australia is recognised internationally yet the impact of this research appears to be limited in terms of its influence and impact on Australian policy and practice. In 2015 I was part of a national research project team who conducted surveys and case studies in 52 Australian schools who were considered

'successful' in terms of improving students' learning outcomes in mathematics. These schools left nothing to chance: they focused on developing mathematical excellence though a consistent approach to students' learning, teachers' skills in teaching mathematics, resources for teaching and teaching and learning mathematics, and a passion and enthusiasm for the enterprise of teaching mathematics. In this keynote, I will discuss the findings from the Best Practice in Mathematics Education project and identify the common characteristics that made these schools successful. I will also share insights from other research projects I have been involved in, including researching flipping the mathematics classroom, and discuss how research based evidence can inform and improve practice, leading to an impact on student outcomes.

As a result of attending this presentation, participants will:

- Gain understanding of what constitutes best practice in mathematics education
- Identify the common characteristics of successful schools that have achieved high gains in student outcomes
- Be informed of the findings from a range of research projects which all have a focus on improving student outcomes
- Be provided with practical examples and suggestions of how they can implement research findings into their own schools and classes.

F5 Lifetime impact: playfulness and curiosity

F - Y10, Keynote, Lecture
Matt Skoss, AAMT

My observations of early childhood teachers is that they quite naturally foster a strong culture of playfulness and curiosity in their classrooms. Parents expect it - students revel in it - teachers deliver it!

As a community of teachers, we have to actively work to continue this classroom ethos on into the later years of students' learning. Many barriers exist! With the relentless demands on classroom teachers, we have to work quite hard to 'make space' for ourselves and our students to engage with mathematical ideas that interest us, in a playful and curious way. Despite playfulness and curiosity being the essence of what mathematicians bring to a problem, I contend that 'school and system demands' pose many barriers to teachers and students behaving in a similar way.

Using some interesting problems as a vehicle, this keynote will share some practical classroom and whole-school approaches that can be used to develop a sense of community between ourselves and amongst our students. In time, strategies relevant to your setting will nudge the disposition of your students towards their mathematics learning. As teachers, we hope to have an impact on their learning, drawing on the thinking and approaches that is in the DNA of mathematicians.

Bring your playfulness and curiosity to bear on a problem or two. And before I forget, please bring your 'iThing' to participate in the 'workflow', to have an impact in your classroom.

F6 Principles of engaging mathematics teaching

Y6 - Y12, Keynote, Lecture
Eddie Woo, NSW Department of Education

One of the central challenges to effective mathematics learning is that we must cultivate an environment and a view of mathematics that motivates students to undertake the work of learning. In this session, we will explore aspects of mathematics that are often under-emphasised but must be recovered to engage a broad range of students in our beautiful and practical subject.

Eddie is the 2018 Australian Local Hero Award recipient. His enthusiasm for mathematics education is infectious. He feels privileged every day to be working with young people to help them grow and flourish and find their place in the world. Eddie began uploading videos of his maths classes in 2012 to YouTube in an attempt to help a sick child in his class. Eddie now has over 300,000 subscribers.

Checkout his wootube
https://misterwootube.com

SESSION G, Friday, 11am-12pm

G1 Differentiating explorations with manipulatives and technology

Y4 - Y7, Workshop
Amy Somers and Leonie Haggett, Lyndale Greens Primary School

In this session we will focus on ways to cater to a range of abilities in the classroom through exploring patterns. We will use manipulatives and technology to help develop student's understanding at their point of need.

Participants will need to bring their own device as we will be using Microsoft Excel to investigate efficient strategies to perform calculations. This will also provide teachers with an example of how to use coding in a practical way in their mathematics classes. At the end of the session participants will have a sequence of three lessons that they can use with their class. To bring - any device with Microsoft Excel installed on it.

G2 Cross-curricular middle school mathematics

Y4 - Y9, Lecture
Jennifer Kain and Andrea Demosthenous, Bialik College

Incorporating cross-curricular projects into the middle school mathematics classroom can be challenging but the endeavour pays off in multiple ways. This presentation offers a glimpse into a project completed this year at Bialik College to build mathematical thinking through meaningful investigations that connect Mathematics to other subjects. The presenters will share their one of their investigations, The Water Balloon Bungee, as well as a step by step process on how to incorporate these types of tasks into our fully packed curriculum. Students' reflections from the investigation will be explored, as well as teachers' insights and goals for the next year.

G3 Autonomous vehicles - driving mathematical thinking

Y7 - Y12, Commercial, Workshop
Peter Fox, Texas Instruments

Five years ago autonomous driving was possible, now it appears inevitable. Companies like Tesla and Google have disrupted this landscape creating an industry that is expected to contribute more than $10 trillion to the global economy. The horseless carriage is morphing into the driverless car. The 2004 DARPA Challenge involved building an autonomous vehicle tracking a course across the Mojave Desert. Entrants modified vehicles, wrote their own code and let their creations loose. Most vehicles crashed within sight of the starting line. How far could your students go? There are many opportunities for contextualised mathematics problems in even the simplest of challenges using accessible robotic vehicles. In this workshop participants will program a TI-Nspire calculator to drive TI-Innovator Rover, a robotic vehicle complete with sensors and mathematical functionality. Are you up to the challenge? Mathematical competency essential; prior coding experience not necessary. Note: equipment will be provided, however if you wish to keep your programs; BYO TI-Nspire CX / TI-Nspire CX CAS on OS4.5

G4 Maths card games that make you 'think'

Y1 - Y10, Commercial, Workshop
Richard Korbosky, Dapma Pty Ltd

Get students excited to learn, think and communicate mathematically playing maths cards games: Subitising Game, Count - Oh Game, Numbers 20-110 Game, Problemo Game. Times Table, Tenth Game, Hundredth Game, Fraction Games and the Relato Game which links fractions, decimals and percentage. The maths cards are enjoyable, challenging and adaptable to different student ability levels. See how you can get students to practice basic facts using a different strategy, focus on mathematical language, see the same concept represented in different ways and develop student's flexible mathematics thinking. See how the card games can be used as an assessment tool. This session is for any teacher who has students who need a different strategy to practice their basic facts in a range of mathematics ideas. The 12 different maths card games allows the teacher to differentiate the classroom.

G5 Mathematics in 'The Greek Anthology'

Y7 - Y12, Repeat, Lecture
Terence Mills, Deakin University

'The Greek Anthology' is a large collection of very short pieces of writing from ancient Greece, which were compiled over several centuries. A translation in English is available in 16 books spread over 5 volumes. The writings in this anthology include inscriptions copied from buildings, poems, and epigrams. However, book 14 is quite different from the other books. Sprinkled throughout book 14 are 45 elementary mathematical problems. Now Pythagoras, Euclid and Archimedes are household names in the history of mathematics in ancient Greece. However, 'The Greek Anthology' is not so well-known in mathematical circles. The purpose of this presentation is to describe these ancient problems. Perhaps they can be used to enrich mathematics in the classroom, or to make innovative connections with subjects such as classical studies or ancient history.

G6 Using Education Perfect to inform your students and your teaching to improve learning in maths

Y7 - Y12, Repeat, Lecture
Kelly Hollis, Education Perfect

Education Perfect is an online learning and assessment resource that is aligned to the Australian curriculum. The platform provides over 800 lessons based on the mastery model that explicitly teach the students a specific concept or skill and then ask them to complete a series of questions and activities that allow them to gain mastery in that particular topic. As a teacher you can quickly and easily choose questions and assess individual students or the class as a whole. These assessments are automatically marked and provide you, the teacher, a snapshot of each student's level of ability as well as gaining an overview of the classes' strengths and weaknesses. These tasks can be used for pre-testing, formative assessments, NAPLAN preparation, revision tests and summative assessments. This session is an introduction to the EP platform and an opportunity to learn more about how you can implement the program into your curriculum. Note: Own device needed (laptop, tablet, etc).

G7 Essential thinking strategies for number facts

F - Y6, Repeat, Commercial, Lecture
John Hein and Michael Ozbun, St James the Apostle School

We will explore different strategies, which enable successful teaching of number intervention including how and why thinking strategies work. Help build student confidence using these powerful visual models to develop fluency with number. We will address identifying students at risk, assessment of understanding and teaching intervention in small groups and whole class setting.

This presentation is based on the research of Bob Wright, the Learning Framework in Number (LFIN) and Origo's Box of Facts. We have been trained in LFIN by Bob Wright and have been successfully implementing both LFIN and Box of Facts strategies for the previous two years.

Are you...

- Interested in building student confidence in numeracy?
- Looking to explore intervention implementation in your school?
- Curious how to move consistent strategies across the school?
- Wanting to identify and target the right students?

If you answered 'Yes' to any of these, then we hope you come along!

Participants will be have the option to bring materials which allow them to take notes e.g. electronic device or pen and paper.

G8 The mathematical opportunities are endless...

F - Y6, Workshop
Tracey Muir, University of Tasmania

As teachers, we are constantly looking for ways to provide students with opportunities to engage in purposeful and authentic mathematical experiences. Mathematical opportunities are everywhere – we just have to be alert for them and capitalise on them in our classrooms. Something as simple as a road sign, a picture story book or a Facebook meme can provide a stimulus for engaging in purposeful mathematical experiences. In this workshop, we will look at some examples of everyday experiences that can be transformed into creative mathematical learning opportunities that promote curiosity and stimulate engagement in mathematics.

G9 Improving students' outcomes through knowing your impact

F - Y12, Repeat, Commercial, Lecture
Alexander Young, Ingenious Technological Enterprises

The author collaborated with schools in three states to develop a 'world first' means for teachers to improve their students' outcomes through 'assessment for learning' and knowing their impact.

When teachers use pre-test/post-test analysis in their everyday teaching they learn how effective their impact has been. This has enabled teachers to 'change their lives and that of their students', or as a speaker at the ACEL 2012 conference put it; 'The students in her school, on average, learn at twice the pace of the nation and at twice the usual depth'. The author has found a large proportion of schools' NAPLAN results appear to be 'flat lining' whereas licensees' NAPLAN results are improving, year on year.

G10 Sabah children learn mathematics through games before school

Early years, Repeat, Lecture
Brian Doig, Deakin University
Connie Ompok, Universiti Malaysia, Sabah

The activities described here have been used to assess pre-school children's mathematical abilities in Sabah.

SESSION G, Friday, 11am-12pm (cont.)

Sabah is a state of Malaysia (formerly British North Borneo) in the North of the island of Borneo. The children have as yet not entered school, and were introduced to playing mathematical games. The games were developed by the authors and others, in order to assess what children know before they enter school. Knowing what children know and can do before they enter school has two major benefits. The first is that pre-school educators are able to develop children's mathematical abilities further, and further, Foundation year teachers are able to develop children further, rather than repeat what they already know and can do.

Importantly, research has shown that children with better prior-to-school mathematical acquisitions develop faster and further in both mathematics and reading throughout primary school. Educators who know this need to have suitable techniques so that they may be the instigators of children's enhanced school development. In this session, some of our games, and the children's responses, will be explored.

G11 Mathematical playfulness

Y7-Y12, Workshop
Eddie Woo, NSW Department of Education

Expanding on one of the themes from his keynote, Eddie will be demonstrating the ways in which playfulness can be used as a context for mathematical reasoning and conversation – using just a standard deck of playing cards.

G12 Challenge, persist and share

F - Y6, Repeat, Lecture
Stacey Lamb, St Bernard's Primary School Wangaratta

With the right amount of challenge, a positive mindset and the platform to share their learning and engage in ideas and strategies, students can learn at a high level. Hear about the success of challenging mathematics pedagogy, students positive mindset in mathematics and how students sharing ideas and their learning has changed the mathematics classroom.

G13 The art of enrichment

Y7 - Y10, Workshop
Narcisa Corcaci, Werribee Secondary College

We all know that one of the most challenging tasks teachers face is creating rich experiences for their students (especially when attempting to extend the more able students). For some reason we believe that we need to spend hours searching and preparing material that will fit this purpose. Sometimes we are even looking to create a new course using a new textbook etc. In this presentation/workshop I will show you how you can extend capable students without any (or very little) special preparation. The alternative name of this presentation is 'How to turn an ordinary question into an extraordinary one' and this is the strategy we are going to explore together. It all starts with an ordinary question from a textbook. What we do with it is what makes all the difference. Pen and paper needed.

G14 Stripping out the detail

Y5 - Y10, Repeat, Commercial, Workshop
Vicky Kennard, Australian Mathematical Sciences Institute (AMSI) ChooseMaths

Constructing inquiry questions is an art. All too often the problems we present to our students already contain all the information they need and all the questions they could ask. They are often presented as multi-part questions, that lead the student through the inquiry. In this presentation I will demonstrate an alternative way of presenting an inquiry. By using visual prompts to allow the students to ask their own questions and request the data/information they need to answer their questions. These 'stripped-back' questions allow the students to follow their own interests and to see the usefulness of the data they request and the mathematical concepts and skills they use. Bring pen, paper and calculator.

G15 Why play mathematical games in primary mathematics?

F - Y6, Workshop
James Russo, Monash University
Toby Russo, Bell Primary School

We argue that there are several compelling reasons for playing games in the primary mathematics classroom that go beyond student engagement and developing computational fluency. Mathematical games leverage off the tension between competition and cooperation on the one hand, and between skill and luck on the other, to support the development of children's social and emotional skills. Many games also provide opportunities for children to think tactically and strategically, as players have to consider both the short-term and long-term consequences of a particular action. Similarly, games can unlock critical and creative thinking, as children consider the opportunities and constraints afforded by the particular rules that must be followed. Finally, games can also be used to differentiate learning in an inclusive manner and to provide a context for parental engagement in their child's schoolwork. These varied benefits of mathematical games are demonstrated through three examples of games developed by the presenters.

G16 Taking tricubes to the limit

Y2 - Y12, Workshop
Doug Williams, Mathematics Centre

A mathematician's work begins with an interesting problem. The visual and kinaesthetic nature of Tricubes immediately generates student interest and the workshop reveals mathematical challenges which can be created with them. The mathematics that can be explored with Tricubes includes 3D spatial perception, 2D representations of 3D objects, measurement of length, area and volume, number patterns such as square, triangular and cube numbers, algebraic formulas and graphs of functions - there is even a hint of limits and inductive proof for Year 12.

G17 Introduction to programming using TI-Nspire

Y9 - Y12, Workshop
Raymond Rozen, RMIT
Shane Dempsey, THAC

In this hands-on workshop, participants will be introduced to programming using TI-Nspire. This can be done using TI-Nspire handhelds, computer software or on the app for the iPad. Programming has become a critical skill for 21st century careers so come along and learn how to create, save, and run programs, including input and output, using loops and conditional statements. No previous programming experience of any kind is required. CAS calculators will be available for participants to borrow.

G18 Investigating complex numbers using series

Y11 - Y12, Repeat, Workshop
Ray Williams and Wendy Watts, St Mark's Anglican Community School

Within this session participants will investigate the properties of complex numbers when multiplied using the Ti Navigator wireless system to work collaboratively. The Ti-Nspire CAS calculator will be used to graphically represent the partial sums of a number of complex series and the effects on these depending upon the magnitudes of the complex numbers involved. Participants will be able to adapt and use the results in classroom investigations involving complex numbers at both Year 11 and Year 12 levels. Participants are encouraged to bring their own Ti-Nspire calculator, however there will be spare calculators made available if required.

G19 Developing and assessing and algebraic thinking

Y4 - Y9, Repeat, Lecture
Max Stephens and Cath Pearn, The University of Melbourne

In the upper primary and junior secondary years, the Victorian Curriculum places a strong emphasis on the development of students' algebraic thinking through their experiences with number patterns and relationships starting in the early years. Other key ideas that support algebraic thinking are equivalence using the four operations, patterns and relationships involving whole numbers, decimals and fractions, and generalisation. This session will present several recently developed assessment instruments that have been used extensively with Victorian students, but also in other Australian states. These assessment tasks draw attention to the importance of fostering and developing students' algebraic thinking as an essential part of the mathematical proficiencies of reasoning and problem solving. These tasks can and should be used to guide teaching and learning in regular classrooms to develop and support student's algebraic thinking, and can also be used for staff professional learning in this important area of the curriculum.

G20 Folk to funk: the mathematics of dance

Y3 - Y8, Workshop
Jennifer Bowden, The Mathematical Association of Victoria
Michaela Epstein, Maths Pathway

Yes we will dance! In this workshop we will actively explore the relationships between mathematics and the art of dance from the Waltz to the YMCA, folk to funk, and genres through the ages we will expose the cross curricular links that will get your toes taping and your brains moving. With activities you can use in your classroom to hook students and more challenging tasks to extend students thinking, this workshop will get you moving. Mathematics and dance is for everyone, but the curriculum connections will be exploring are level 3 – 8. Dancing shoes welcome but not essential.

G21 Design Thinking in maths classes

Y6 - Y12, Repeat, Workshop
Jan Mann and Ming Gao, Wellington Secondary College

Design Thinking is a human centred approach to collaborative and creative problem solving. It is a great way to help students develop their knowledge and skills involving multiple subjects. In this workshop, we are going to share our experience in use of Design Thinking in teaching

SESSION G, Friday, 11am-12pm (cont.)

mathematics including developing their study skills, and further explore ways to use Design Thinking in classes.

G22 Anticipating the Cambridge Maths Framework: making connections

F - Y9, Repeat, Workshop
Lynne McClure, Cambridge Mathematics, Keynote presenter

One of the design principles underpinning the Cambridge Maths Framework is that of connectedness. In this session we'll play with some intriguing contexts or intriguing maths to: make connections between fluency, reasoning and problem solving; promote success through supporting thinking at different level of challenge; encourage collaboration, confidence and creativity, and make connections between domains. We'll use Ruthven's three stages of exploration, codification and consolidation to structure our activity.

G23 Why we need critical and creative thinking: an industry perspective

Y4 - Y9, Lecture
Felicity Furey, Machinam

How do we create, plan and invent a future that doesn't exist yet? How will we solve the challenges of water or food shortages, energy crises and invent products to make our world a better place?

To build the future we need all citizens to have critical and creative thinking skills. To achieve a high level of ability in this area for future industry we must begin early by:

- embedding critical and creative thinking at the core of learning
- embedding the language of STEM
- understanding the 'why' of what we do not just the 'how'
- developing a mindset of curiosity and leadership
- understanding it is ok to fail, it's how you fail that counts.

Knowing why critical and creative thinking is important is the first step in developing strategies to ensure our students get thinking early in their schooling.

G24 Leading a changing maths culture

F - Y6, Repeat, Workshop
Amy Backas, Morang South Primary School

A journey undertaken by a small leadership team in identifying, analysing, shaping, influencing and changing a whole school culture around maths. Morang South Primary School began this journey five years ago around shaping our future maths culture to suit the needs of 21st century learners. After undertaking Bastow's Leading Maths in 2017 this journey has started to have a significant impact on our data, attitudes and perceptions around maths. This presentation will cover how to begin this process, ways of uncovering attitudes (students, teacher and parent community) and how to track the shift over an extended period of time. This is a must for schools who are in the processes of shifting their maths culture.

G25 Warm ups and engaging classroom activities

F - Y9, Workshop
Nadia Abdelal, Australian Mathematical Sciences Institute (AMSI)

Maths warm-ups can hook our students in and get them ready for more effective maths learning. In this hands-on workshop, I will be presenting a number of fun and engaging warm-ups to tune our students in, as well as some stand alone activities that will likely become a staple in your classroom.

G26 The mathematics of wind design

Y9 - Y12, Repeat, Lecture
Michael O'Connor, Australian Mathematical Sciences Institute (AMSI)

An excellent example of where maths is used in modern civilisation. December 17 marks the 115th anniversary of the first human powered flight. Since then humanity has gone on to make air travel a daily event for millions of people. In order to make this a reality it was necessary to understand how to produce forces that would overcome gravity and air resistance. The mathematics involved in designing and building a plane can all be acquired by the end of Year 12 from Methods and Specialist content. As a way of demonstrating how and where high school mathematics is needed in the modern world, powered flight is an example par excellence.

G27 Reciprocal teaching in mathematics

Y5 - Y10, Repeat, Lecture
Thao Huynh and Alex Mills, Sunshine College

Reciprocal teaching is an effective strategy to help students to decode worded mathematics problems. This is a literacy strategy to build comprehension which has been modified to maximise its effect in the specialised field of maths problem solving. We will describe how the strategy works, give you a students' eye view of the process and share some resources for you to trial the strategy in your own classes.

G28 Challenging tasks: inspiring ideas for transforming the early years classroom

F - Y3, Repeat, Commercial
Johnson Alagappan, Gilson College (Taylors Hill)
Sharyn Livy, Monash University

The early years of schooling is an exciting period in the cognitive development of a child. The concrete operational stage is marked by the onset of logical thought, inductive reasoning and understanding of conservation concepts. Do the mathematical tasks presented to young children match up to their cognitive abilities? In this research based workshop, we will explore how challenging mathematical tasks were presented in the early years, how enabling and extending prompts were created and what actions were taken to encourage persistence. Be involved and inspired by an exciting, transformative workshop that will surprise you with the abilities of young children. Take away concrete ideas for immediate application in your classroom. Bring an open mind and be prepared to be challenged!

G29 Fractionally more interesting than pizzas and pies

Y3 - Y8, Repeat, Workshop
Helen Booth, Australian Mathematical Sciences Institute (AMSI)

Gaining a solid conceptual understanding of fractions is hard. It requires children to recognize that many properties of whole numbers are not true of numbers in general and to think about how numbers relate to each other rather than principally use additive thinking strategies. By the end of primary school, it is assumed that they will have the mathematical maturity to engage in proportional reasoning allowing them to access more advanced mathematics. Yet so many of our students struggle to conceptually understand fractions and fail to make the jump into intermediate or advanced mathematics.

This workshop looks at way to build conceptual knowledge using physical and visual models so that students have a deeper understanding what fractions are, how to use them and their relationship to multiplication and division.

G30 Developing deep mathematical understandings in STEM contexts

Y7 - Y10, Workshop
Jim Lowe, YuMi Deadly Centre QUT

Effective pedagogy encourages deep understanding of powerful mathematics through a focus on sequencing, connections and big ideas. There is a concern that these deep understandings are often lost in an integrated STEM context. Research is showing that the vision for integrated STEM is not being realised and has the potential to undermine in-depth student learning. This presentation will encourage participants to experience, hands-on, some common STEM activities incorporating technology to highlight the potential for deeper mathematical investigations. A variety of technologies and some introductory coding opportunities will be used to engage participants in these investigations. The focus will be on what is required to ensure the role of mathematics in STEM activities is such that it allows for deep mathematical understanding, and to recognise when and how to ensure there is mathematical depth.

G31 Computational thinking: going beyond the text book

Y7 - Y9, Workshop
Sanjin Dedic, Techxellent
Meg Pini, G.A.T.E.WAYS Gifted and Talented Education

Middle school mathematics students tend to solve most problems by applying a template algorithm/method like the one presented in the worked examples at the start of each chapter of a textbook. Because of this habit some students freeze when faced with a problem that cannot be solved by any such method. This workshop will present a set of exercises in the form of flowcharts and procedures which are designed to help students use an iterative approach to problem solving involving educated guesses and subsequent feedback. They will also learn new ways to both conceptualise and draw algorithms which will help deepen their understanding of both coding and mathematics. Please bring a charged laptop to the session, part of it will include programming in Scratch.

G32 Why is 'showing your work' so important?

Y10 - Y12, Lecture
Dietmar Schaffner and Maria Schaffner, Penleigh and Essendon Grammar School

This presentation will explore the findings of a peer group research project into how senior students write mathematics, why they write mathematics the way that they do, the extent to which their mathematical thinking is influenced by their writing (and vice-versa) and the extent to which it is important for students to write with precision using conventional mathematical terminology and symbolism. The rationale for the research project was to improve students' ability to respond to 'show that' questions and to find ways to alleviate persistent algebraic misconceptions and avoid what we euphemistically call 'silly mistakes' in tests and exams.

SESSION G, Friday, 11am-12pm (cont.)

G33 Boring, pointless and scary!

Y3 - Y9, Repeat, Commercial, Workshop
Andrew Lorimer-Derham, Think Square
Michael Briggs-Miller, Teach Of Australia

Sadly, these are some of the most common words our students associate with maths. This mindset (often inherited) creates enormous barriers to learning and enjoying mathematics. It's time to shift this thinking.

This hands-on workshop will showcase a range of engaging games and activities to increase your capacity to:

- Engage learners of any ability
- Build skills and confidence in your weaker learners
- Get students working together and thinking out loud
- Encourage curiosity and creative thinking
- Provide rich, challenging tasks with a low floor and high ceiling
- Foster a love of maths

G34 Promoting problem solving and critical thinking using iPads

F - Y6, Workshop
Sara McKee and Melissa Lake, Wedge Park Primary School

This session will discuss the structure of a problem solving lesson, and also provide participants with ideas in how to incorporate both teacher and student iPad use in the problem solving classroom. It will discuss strategies for encouraging students to share their thinking, and how PLT's can plan effective problem solving lessons. Please bring your iPad.

G35 Developing UDFs, notes pages and widgets

Y10 - Y12, Repeat, Lecture
Chris Ireson, Melbourne High School and Texas Instruments T3 National Instructor
Len Bedier, Melbourne High School

Learn how easy it is to write and use User Defined Functions (UDFs), notes pages and widgets on the TI-Nspire CX CAS Calculator to aid your students in Technology Active Assessments. From finding equations of straight lines to finding graphical information about an equation in one step, these ideas can be applied to almost all topics that have CAS Applications. Please bring your TI-Nspire CX CAS Calculator to write your own UDFs and widgets and to receive some sample ones as well. Not suitable for a Casio Calculator.

G36 Inquiry based, student centred pedagogies can improve the mathematics learning of all students

Y7 - Y11, Lecture
Peter Sullivan, Monash University

When students solve mathematical problems for themselves not only do they connect new ideas with what they already know but also they are more likely to remember and transfer their knowledge. There are a number of important steps in planning such learning. Problems and tasks can be introduced without telling the students what to do, the teacher can facilitate the learning rather than 'telling', the tasks can be differentiated for students who experience difficulty and those who finish quickly, and follow up tasks can be created to consolidate the learning activated by the initial problems. Examples of learning sequences will be presented, including from the reSolve project, to illustrate the stages of individual lessons and sequences of lessons.

G37 Numbers and nerds: exploring maths in the media

F - Y12, Repeat, Lecture
Jennifer Hall, Monash University
Michael Minas, Williamstown North Primary School

In this session, we will present findings from a research-practice partnership in which Jennifer conducted academic research about representations of maths and mathematicians in children's media, and then Michael explored the same topic with his class of Year 5/6 students. We will share our findings from the two projects, including examples from popular media sources such as The Big Bang Theory, The Simpsons, and the Harry Potter series. This presentation will address the importance of media representations in shaping students' views of and attitudes towards maths and mathematicians, as well as towards themselves as learners of mathematics. Finally, we will also share some practical suggestions for implementing a similar project with your own students.

G38 Teaching coding without technology? Yes I can!

F - Y6, Workshop
Samantha Bothe, Victoria University

The recent introduction of the digital technologies curriculum in the primary years poses some challenges for teachers and schools. The issues of teacher knowledge, resources and financial constraints can be barriers to implementation. However, it is possible to teach many parts of the digital technologies curriculum through unplugged coding and develop algorithmic thinking skills in students, incorporating concepts from several disciplines. The proposed workshop provides an opportunity for educators to engage in and experience various unplugged coding activities which use simple resources. In collaboration with others, participants create and trial algorithms for everyday tasks as possible activities to use in their own school contexts.

G39 So the answer is an integer?

Y5 - Y10, Lecture
Mike Clapper, Australian Mathematics Trust

In many mathematics challenges and competitions, the answers, and often many of the variables, are declared to be whole numbers. However, students often lack the tools to take advantage of this information. This presentation explores strategies for working with whole number problems (diophantine equations) suitable for any student who wishes to do well in such competitions. Questions considered will be drawn from a variety of sources, including AMC, Maths Challenge, AIMO and MUMC.

G40 Virtual reality - making all maths imaginary

Y5 - Y10, Repeat, Commercial, Workshop
Thomas Moore, EngageME Mathematics
Tony Vallance, Lilydale High School

We will explore a number of ways to use virtual reality within your maths class to engage your students. As well as the impact this has had when working with students from our school. These will range from using Vive headsets to cheaper and more cost effective methods such as google cardboard in order to teach mathematics in an engaging way. Please bring along your phones.

SESSION G-H, Friday, 11am-1.20pm

G-H1 Using LaTeX to produce professional mathematical documents

Y9 - Y12, Double Session, Workshop
Neil Holden, Ivanhoe Grammar School

In this workshop participants will learn to use LaTeX, an open source, technically challenging package, to produce professional mathematical handouts, notes and examinations. No prior knowledge will be assumed. You will need a laptop with the software installed prior to attendance attendance (see bit.ly/mavlatex). It's very fiddly, so we aim to cover the basics. You should expect to invest a lot of time after the workshop perfecting your skills, but the reward is to be able to very quickly produce outstanding crisp mathematical documents.

G-H2 Limited by our own imagination!

Y10 - Y12, Repeat, Double Session, Workshop
Craig Browne, TI Australia

This workshop is designed to help participants get started in creating dynamic files using the Notes Page Application on the Ti-Nspire CAS calculator. The workshop will feature examples of files that answer problems efficiently as well as examples of files that are used as effective teaching tools. The workshop will finish with the participants being shown how to create their own files. Content covered in the workshop will vary from year 10 level through to Year 12 level, with examples from each year level demonstrated. It is intended that by the end of the workshop participants will have gained enough skills to create their own files or modify files that they have been able to secure. Laptop with TI-Nspire CAS Calculator Teacher Software version 4.5 installed. TI-Nspire CAS calculator can be used but it is more cumbersome! The skills are relevant to the TI-Nspire CAS technology only.

G-H3 Using formative assessment to plan differentiated instruction in mathematics

F - Y10, Repeat, Double Session, Lecture
Lindsay Wehrwein, Brookside P-9 College
Andrew Cordell, Victoria University Secondary College

Meeting the diverse needs of a class of students is often identified as a teacher's most significant challenge. This presentation will focus on the work at several colleges, catering for students in mathematics from Prep through Year 10. Through an action research process using student formative assessment data to drive instruction, significant gains are being observed. This process involves using multiple data sets, including data from authentic student work, alongside developmental progressions, to create multiple lesson types that explicitly differentiate learning experiences to cater for different cohorts of students within one class. Assessment tools used include common standardised assessments together with problem-based (5-Practices) lessons. Data gathered is triangulated to establish a students' development level at a specific point in time. What teachers are discovering once having started on this journey is that it is impossible to revert to a traditional whole-class model of instruction.

G-H4 Informatics: challenging, inspirational and relevant coding

Y7 - Y12, Repeat, Double Session, Lecture
Jan Honnens, Christ Church Grammar School

At Christ Church Grammar School we have over the last few years built a culture of enjoyment and excellence in informatics based on lunchtime sessions, informatics coding camps and a year-round involvement in computer programming competitions. Informatics, a mix of computer programming and mathematical thinking, has become a key motivator for many of our student and has helped them unleash their potential in both computer science and mathematics. In this session we will have a look at our Informatics Club model and discuss a solution (in Python) to a problem from each of the eight computer programming competitions that we use. We tirelessly encourage our student to be active learners and attempt the problems before we share a solution with them. Similarly, for this session we offer you the opportunity to have a go at the problems before we give away the solutions! The problems are available at http://tinyurl.com/8problems. Please bring a laptop with Python installed (e.g. IDLE from python.org)

G-H5 Using computers in a maths classroom with Year 11/12+ students

Y10 - Y12, Commercial, Double Session, Lecture
Robert Rook, Mathculator

This session will run through using technology in the classroom for Years 11/12+. Among the topics covered are graphing, calculus, consumer maths, complex numbers, distributions, functions, parametric and polar graphs, regression, statistics (junior & senior), modelling data, trigonometry, probability and vectors to name a few. Generation of various 2D and 3D equations including above topics plus 3D planes, surfaces, tori, knots, solids of revolution. Use of the senior worksheet generator (Year 12), topic revision/test program, homework book generator will be explained. Questions are randomly generated giving an

infinite number of questions with not only answers but full solutions available for questions. Questions can be attempted at the computer and at home and results saved for progress to be observed. Questions can be emailed to teachers. All attendees will receive a free registered copy of the latest software to take home and load on their home computers.

G-H6 Birth to Level 10 mathematics teaching toolkit

F - Y10, Repeat, Double Session, Workshop
Victoria Hall and Angela Scuderi, Department of Education and Training

The Department of Education and Training's Birth to Level 10 Mathematics Teaching Toolkit (the Toolkit) will support teachers by providing quality assured, multi-modal resources, access to current research and self-paced professional learning modules. These resources and supports have been developed by the Department with teachers and educators, maths and numeracy experts and the Mathematics Association of Victoria. Join us in this interactive workshop to explore the elements of the Toolkit and engage with these resources. Computer or tablet is preferred but not essential, writing tools and a notebook.

G-H7 'Leadership content knowledge': what do leaders need to know?

F - Y10, Repeat, Double Session, Workshop
Nadia Walker, Benton Junior College

Whether you're a mathematics curriculum leader, an Assistant Principal or Principal, there is key knowledge and skills that are required to enhance the learning of students in mathematics. Most importantly, effective instructional leaders must be able to articulate their vision for mathematics teaching and learning, as well as differentiate between high quality and low quality instruction. In this session we'll use tasks and work samples from the classroom to identify high quality instructional practices, discuss ways in which leaders provide purposeful feedback to teachers and strategies for communicating expectations of high quality practice.

G-H8 Algorithmic and computational thinking using R software

Y10 - Y12, Repeat, Double Session, Workshop
Nazim Khan, St Mary MacKillop College

This workshop will provide participants with a hands on experience on implementing R software in their senior mathematics courses. R is an open source and internationally renowned software with capabilities that far surpasses the graphics calculators. In addition to using the implemented functions in R, students will have the freedom to manipulate R codes to create their own functions, as well create new functions and consequently undertake bigger projects (using R codes) in mathematics like modelling real-life phenomenon using mathematics functions and make inferences. The workshop will attempt to provide examples of using R in the following topics: functions and graphs, trigonometric and inverse trigonometric functions, exponential and logarithmic functions, counting and probability, arithmetic and geometric sequences and series, differential and integral calculus and applications, statistics: discrete and continuous random variables; point and interval estimates; statistical inference, combinatorics, vectors in the plane and 3D, matrices; real and complex numbers. Participants are required to install R software from the following link and bring along their laptops: www.r-project.org.

SESSION H, Friday, 12.10pm-1.10pm

H1 Writing instructional material for mathematics

Y10 - Y12, Lecture
Neale Woods, Distance Education Centre Victoria

In this session, Neale Woods will cover a range of skills he uses for presenting mathematical content for both print and online delivery. Skills demonstrated include creating Word templates, formatting hints, MathType formats and shortcuts, writing instructions for various CAS technologies, and converting maths equations for online delivery. The session will a presentation rather than 'hands on'. However, participants are encouraged to bring a laptop to trial some of the techniques covered during the session.

H2 Quick is the aim, smart is the gain.

Y4 - Y9, Repeat, Commercial, Lecture
Helen Barker, Anne Parnell and Troy Lowe, Numurkah Secondary College

QuickSmart is a numeracy intervention program that is offering fourth phase intervention (or in some cases a last chance intervention), to students between Years 5 and 8. It improves middle school students automaticity with simple maths operations, such as times tables; this frees up working memory to enable the students to process more complex mathematical computations.

Here at Numurkah Secondary College we are now in our fourth year using the QuickSmart program. NAPLAN and PAT testing results show improved scores when compared to the control group. The 6's component of the program has been used to our top Year 12 students to improve their ability to discriminate which skill to use and to interpret multifaceted exam questions.

H3 Maths, magic and more

Y7 - Y10, Repeat, Workshop
Stephen Hanlon, Braemar College

Maths, Magic and More is the title of my Year 9/10 semester elective delivered this year at Braemar College. Focused on mathematical tricks using numbers and playing cards, and their links to topics that complement the curriculum; short cuts and alternative methods to improve by-hand numeracy and mental arithmetic; challenge questions and assignments to develop problem-solving and reasoning skills. In this session, I will elaborate on the program, demonstrate many of the tricks and explain the underlying mathematics. Come and see how you can easily incorporate some of these activities into your mathematics classroom. Needed, calculator and a sense of adventure.

H4 Maths Method adding value through team approach

Y10 - Y12, Repeat, Lecture
James Poon and Jimmy Drossos, Carey Baptist Grammar School

The Carey approach to teaching Methods was identified as one that is welcomed by students and has shown significant value-adding in the VCAA analysis. Using technology, and in particular screen capture videos, the team has been working towards flipping lessons, differentiating curriculum, and building students' independence in their study. This team approach to teaching reaches out to all students of all abilities and leverages the strength of all team members - curriculum planning, differentiation, technology, and overall result analysis. By customising this to our students they are more engaged and willing to learn. In this workshop, we would like to share our approach to teaching Methods and some of the videos, websites, worksheets, and notes that have contributed to our success.

H5 Reasoning: the forgotten proficiency

F - Y6, Repeat, Lecture
Michael Nelson, Portarlington Primary School

This presentation will explore the research around reasoning in mathematics and its importance to developing complete students of mathematics. It's major focus will be on how teachers can implement the teachings of the research, what they look like for the teacher and what they look like for the students. It's purpose is to assist teachers in integrating a strong research based reasoning program within their current teaching program, rather than sitting as a separate entity. Teachers will see how what they are already doing can be modified to emphasise reasoning and be used to increase students ability to transfer their knowledge as well as solve problems. Delegates are not required to bring anything for this presentation.

H6 Creating impact with Wolfram|Alpha

F - Y12, Repeat, Commercial, Lecture
Craig Bauling, Wolfram Research

Wolfram|Alpha helps millions of people each day explore their world through our world leading knowledge computation engine. In this session we will explore

how students, teachers and scientists are accessing it to help give them insight into their world. Craig will demonstrate the key features that are directly applicable for use in teaching. Topics of this technical talk include :

- Enter scientific calculations in everyday English, or using the flexible Wolfram Language
- Visualise data, functions, surfaces, and more in 2 D or 3D

Access trillions of bits of on - demand data

- Employ powerful analytics to your student's lab data
- Use semantic import to enrich your data using Wolfram curated data

Prior knowledge of Wolfram|Alpha or Mathematica is not required - new users are encouraged. This is a great opportunity

to get faculty not experienced with Wolfram|Alpha and Mathematica involved and excited.

H7 Preparing for Methods Examinations – a video highlights package

Y11 - Y12, Repeat, Workshop
Alastair Lupton, Le Fevre High School

Preparing for the Mathematical Methods Examination 2 can be demanding – you need to know your mathematics as well as have some pretty decent skills, both with and without technology. In this session, we will dip into some revision resources presented via video. In an 'all killer, no filler' highlights package, we will look at sections of past exams (2016 and 2017 in particular) where technological demands were high, as well as sections where discerning selection of 'e-tech' and 'by-hand' techniques was called for. The revision resources feature Classpad use, as well as fully worked and explained 'by-hand' solutions. Bring your ClassPad if you want to play along, or just sit back and enjoy the show!

H8 Sabah children learn mathematics through games before school

Early years, Repeat, Lecture
Brian Doig, Deakin University
Connie Ompok, Universiti Malaysia, Sabah

The activities described here have been used to assess pre-school children's mathematical abilities in Sabah. Sabah is a state of Malaysia (formerly British North Borneo) in the North of the island of Borneo. The children have as yet not entered school, and were introduced to playing mathematical games. The games were developed by the authors and others, in order to assess what children know before they enter school. Knowing what children know and can do before they enter school has two major benefits. The first is that pre-school educators are able to develop children's mathematical abilities further, and further, Foundation year teachers are able to develop children further, rather than repeat what they already know and can do.

Importantly, research has shown that children with better prior-to-school mathematical acquisitions develop faster and further in both mathematics and reading throughout primary school. Educators who know this need to have suitable techniques so that they may be the instigators of children's enhanced school development. In this session, some of our games, and the children's responses, will be explored.

H9 Turbocharge your ClassPad

Y10 - Y12, Repeat, Workshop
Charlie Watson, The Tuition Centre

This hands-on workshop is designed for teachers who want to help their more able students learn how to turbocharge their ClassPad with extra functionality. Starting with some very simple techniques in main and eActivity, we'll finish by learning basic skills to solve problems with the program app. Sound a bit nerdy? Maybe, but the focus will remain on applications of math to help you and your upper school students become highly efficient ClassPad users. Bring along your ClassPad and a reasonable working knowledge of it. A small number of ClassPads may be available to borrow at the session.

H10 For the love of Maths 300

F - Y6, Repeat, Workshop
Ellen Corovic and Jennifer Bowden, The Mathematical Association of Victoria

During this session, Jen and Ellen will explore a handful of rich and challenging tasks developed by Maths 300. Teachers will develop their knowledge of how to navigate the Maths 300 resources and they will be engaged with hands on-tasks set to provoke mathematical thinking. Teachers should be prepared to test and justify their understandings as well discuss and justify the merits of engaging learners in meaningful and authentic tasks.

H11 Superannuation - ignorance may be bliss, but also expensive

F - Y12, Repeat, Lecture
Rob Vermay

Financial literacy is a mandated component in the national curriculum but this topic is likely to be directly relevant to your own personal circumstances. This seminar attempts to demystify superannuation to help you understand how it

SESSION H, Friday, 12.10pm-1.10pm (cont.)

involves you, why you need it and the fundamentals of how it all works. We will discuss choices, access to superannuation funds, taxation, concessional and non-concessional contributions, opportunities and potentially expensive traps, all governed by some important and relevant regulations. This seminar may provide a more substantial background for your teaching. The presenter is not a licensed financial advisor. The only advice offered is that your best investment is likely to be in time to educate yourself.

H12 Raising challenge through questioning

F - Y9, Repeat, Workshop
Leonie Anstey, Leonie Anstey Consulting

This hands on workshop will focus on teacher questioning techniques within learning tasks. You will develop skills and knowledge that will allow you to facilitate dialogue and discussion prompting deep understanding of mathematics concepts. These ideas will be explored through lessons highlighting differentiation allowing all students to make progress in their learning.

H13 Where do you get your ideas???

F - Y9, Repeat, Workshop
Jacinta Blencowe, Australian Mathematical Sciences Institute (AMSI)

When talking to teachers about problem solving and inquiry maths, one of the questions I get asked most often is 'Where do you get your ideas?'. This workshop looks at ideas and resources for open ended questions, inquiry maths, investigation maths and problem solving.

H14 VCE Algorithmics HESS - introducing algorithmic thinking to students

Y7 - Y12, Repeat, Workshop
Georgia Gouros, Distance Education Centre Victoria

Teaching and lesson resources will be presented, and shared, on how to encourage students to apply logic, and mathematics to solve problems by creating algorithms. In this workshop we will look at activities to help encourage algorithmic and computational thinking and problem solving in our students. The aim is to enable students to be able to model the problem presented, and identify the variables, and parameters, and then construct logical and mathematical processes, and methods for finding the solution.

H15 What's the rush? Using reflection to promote self-regulation

Y4 - Y10, Repeat, Workshop
Karen McMullen, Killester College

Often teachers are in a rush to cover the set curriculum but can this lead to a classroom of passive learners? Providing students with the opportunities to be more actively involved in their learning can have a positive effect on their achievement. One way of supporting students to be more actively involved is through purposeful reflection on their learning. This workshop encourages teachers to use reflective learning techniques with their students to promote thinking and self-regulated learning. Participants will be exposed to a range of reflective tools they can use with their students along with examples of how they can be used in the classroom.

H16 Exploring sequences - what can they tell us?

Y10 - Y12, Workshop
Brett Stephenson, Guilford Young College

A serious investigation of finite and infinite series becomes well within the reach of high school (and especially Year 11/12) students when technology such as graphics calculators is available to do lots of the calculations. This workshop will look at using sequences to evaluate both familiar constants and non-familiar constants (even chaotic ones). Sequences that will be investigated will be the Fibonacci and subsequent Multinacci sequences and a sequence based upon predator/prey formulae. The investigations will be presented using a Casio Classpad graphics calculator but all the investigations could be completed with alternative technologies. Bring a graphics calculator if you have one. Casio Classpads will be available if you do not have one.

H17 An interactive statistical sampling activity with chocolate

Y8 - Y12, Repeat, Lecture
Anthony Morphett and Jennifer Palisse, The University of Melbourne

We will present an activity that engages students with key statistical ideas – including sampling, bias, variability and estimation – using virtual blocks and real chocolate. The activity provides an experiential foundation for building understandings of important statistical concepts, produces data which are meaningful to students, and it is a learning task that allows for multiple entry and exit points. Furthermore, it can be tailored for year levels 8-12 and class sizes from 20 upwards. The activity is easy to implement, supported by

good documentation and freely available on the web. Note: This is a repeat of the same session from MAV 2017. Please bring a laptop, tablet or mobile device if possible.

H18 Encouraging independent learning by increasing literacy in VCE Further Mathematics

Y10 - Y12, Repeat, Workshop
Rod Williams and Deb Murrell, Lavalla Catholic College

Noting that many students did not understand what a VCE Further Maths question was asking, it was decided to work with the students' literacy and other soft skills in Unit 1 with the intention to improve independence, confidence and motivation in maths as they progressed through VCE. Students were encouraged to perform analyses of questions to determine the skills involved and then if any given question required a one stage, two stage or multi stage approach. Supplementary literacy techniques (such as compare and contrast) were also used for key concepts. Students worked with text and VCE past exam papers and created a taxonomy of questions. As a result, students choose which questions they need to complete to consolidate a specific skill or technique. This presentation is a tour through our journey into working on literacy in a VCE mathematics classroom and participants are invited to share their experience of this.

H19 Design Thinking in maths classes

Y6 - Y12, Repeat, Workshop
Jan Mann and Ming Gao, Wellington Secondary College

Design Thinking is a human centred approach to collaborative and creative problem solving. It is a great way to help students develop their knowledge and skills involving multiple subjects. In this workshop, we are going to share our experience in use of Design Thinking in teaching mathematics including developing their study skills, and further explore ways to use Design Thinking in classes.

H20 Measuring a dampening effect, trigonometry meets the exponential

Y11 - Y12, Repeat, Workshop
Anthony Harradine, Potts-Baker Institute, Prince Alfred College

Using automotive shock absorbers as the stimulus, the motion of a spring will be dampened with various dampeners of differing severity; we will measure the effect of each dampener and then investigate how the dampening effect is related to the surface area of the dampener.

H21 It's hailing numbers

Y4 - Y9, Repeat, Workshop
Katherine Seaton, La Trobe University

Odd numbers, even numbers, prime numbers and even the Fibonacci sequence - your students probably know all of them. But what about the hailstone sequences? Come and find a variety of low-threshold-high-ceiling ways to explore them: in words, games, lists, images, graphs, metaphor, equations, and even cartoons and colouring sheets. If your students think that all of maths is known, then the Collatz Conjecture may be just what you need to open their eyes.

H22 Capturing the spirit of a Year 12 Methods investigation

Y11 - Y12, Repeat, Lecture
Mark Oudshoorn and Zoë Carolan, Wantirna College

Like us, you may have had difficulty constructing an investigation that you felt met the requirements for the major analysis SAC task in Unit 3 Methods, but was also accessible to students of varying abilities.

In this session we will show you how we used a range of resources made available by VCAA and old CAT tasks from the 1990s to develop a unique and challenging mathematical investigation, that we believe captured the spirit of the intentions documented in the current study design. Students used a combination of CAS technology and DESMOS graphing software to accompany their investigation.

We will share our SAC as well as some of the preparatory tasks. Please bring a laptop and CAS calculator.

H23 Just right maths!

Y3 - Y10, Repeat, Lecture
Yvonne Reilly and Jodie Parsons, Sunshine College

Using differentiation to create a fully inclusive classroom. In this session we will look at an effective way to design and deliver differentiated activities to ensure every student, regardless of ability, feels included in the classroom. This session will provide practical examples of how to create differentiated tasks and describe the delivery strategies which will ensure successful outcomes for students and satisfying classroom experiences for teachers. We will be sharing some resources with you, so please bring a USB.

SESSION H, Friday, 12.10pm-1.10pm (cont.)

H24 Launch explore summarise - engaging open tasks

F - Y6, Workshop
Brendan Hodge, Lang Lang Primary School
Chris Terlich, Cowes Primary School

What is the most effective mathematics instructional model? Unpacking launch - explore - summarise, a mathematical lesson approach to deliver rich open learning to all students. Breaking down rich open learning tasks and how to implement them successfully in our classroom.

H25 GeoGebra in the classroom - building conceptual understanding

Y8 - Y11, Repeat, Workshop
Danijela Draskovic, The Mathematical Association of Victoria

This is a beginner's introductory workshop on the free software, GeoGebra. In this workshop participants will explore the use of GeoGebra as a tool for supporting a visual and interactive mathematics pedagogy that emphasises conceptual understanding rather than procedural. Participants will be shown a demonstration of how GeoGebra can be utilised in the classroom when teaching quadratic transformations, trigonometry and the unit circle, Pythagoras' Theorem and geometry. It will also include some ways teachers can enhance student understanding by using pre-programmed applets within GeoGebra, as well as involving students in the creation process by getting them to create their own GeoGebra files. The skills learnt in this presentation can be applied to most secondary year levels. Participants will be required to install GeoGebra to their laptop devices before the workshop begins.

H26 Essential Assessment – Victorian Curriculum assessment and curriculum made easy

F - Y10, Repeat, Commercial, Lecture
Andrew Spitty, Essential Assessment

Essential Assessment provides an easy and affordable way for Victorian primary and secondary schools to deliver a consistent and whole school approach to Victorian Curriculum numeracy and literacy assessment and curriculum. Essential Assessment delivers a whole school approach to summative and formative assessment and delivers a online differentiated assessment and curriculum model aligned to the content descriptions of the Victorian Curriculum. Our online assessment program assesses and develops student knowledge within each proficiency standard while delivering a consistent approach to whole school data. Our online platform creates a differentiated online curriculum to progress each students understanding within each strand, sub-strand and topic of the Victorian Curriculum!

H27 Demystifying surds - an alternative approach!

Y4 - Y12, Repeat, Workshop
Greg Sheridan, The Scots School Albury

Surds are traditionally a topic that students learn by rote rather than through a clear understanding. Unfortunately, how they are manipulated and their link to algebra is often missed. This workshop aims to reverse this paradigm by taking a quick look at the history of irrational numbers and their evolution. Participants will then use Pythagoras, number line activities and algebra to look at surds from a different perspective. Upon leaving you will have a great set of lessons to introduce surds with meaning. Prior to coming, ask your students to draw a number line and mark where the square root of two and three lie respectively on this number line (do not give any hints or allow the use of a calculator). Bring a sample of the the results with you for discussion.

H28 Using assessment for creative and critical learning experiences

Y4 - Y8, Repeat, Lecture
Pauline Rogers, Essential Assessment

Learn and experience how to start with something simple such as an assessment question to create your own critical and creative thinking and learning experiences in the classroom. The session will explore critical and creative thinking in the mathematics setting, and then show how assessment materials could be used as the starting point to develop these experiences. Using assessment materials may provide students with the opportunity to develop resilience and perseverance when presented with assessment questions, that they find challenging. Participants will have time during the session to develop some activities to share and then take to use in their own classrooms.

H29 A look at networks and decision mathematics

Y10 - Y12, Repeat, Commercial, Lecture
Vicky Kennard, Australian Mathematical Sciences Institute (AMSI)

Connecting the mathematics students learn in class to the 'real world' and showing its relevance to their future lives is the number one challenge for maths teachers. AMSI have developed a unit of work for teachers who deliver the Further Maths module on networks and decision maths based on real world examples in the airline industry. The presentation will showcase this resource.

H30 Digital diagnostic assessment - be smart about planning

Y7 - Y10, Repeat, Commercial, Workshop
Vanessa Rule-Paddle

This session focuses on how using digital diagnostic assessment tools can make planning for learning more specific to students' needs. It draws on several studies which have shown how teacher planning has been impacted by such information. Online assessment tools can be used to provide diagnostic information about students' thinking. One such tool is 'Specific Mathematics Assessments that Reveal Thinking' (SMART) tests. The SMART tests system includes individual student diagnoses and teaching advice consisting of potential student difficulties and how to address these. Findings suggest teachers and their students can benefit from access to developmental stages associated with learning specific concepts and the potential difficulties students may encounter.

H31 Transforming numeracy outcomes through effective multi sensory CRA methodologies

F - Y6, Repeat, Commercial, Workshop
Esther White, Evidence Based Education Resources Inc

Australia's falling numeracy results prove that an abstract approach to maths education is absolutely ineffective and does not meet the needs of primary students. Maths is a sequential subject that requires foundational understanding before a student can progress to life application and higher order problem solving. As such, it must be taught with progression from addition(subtraction) to multiplication (division) , fractions, then decimals and percents.

In this hands-on and interactive workshop, we will cover:

- a brief overview of the research behind this methodology and why it is essential for transforming numeracy outcomes.
- the benefits of a multi sensory approach for long term maths understanding, engagement, enjoyment and mastery

hands-on experience, of our 'concrete - graphic representation - abstract' methodology and the use of Math-U-See manipulatives as the basis of effective maths instruction throughout primary years.

H32 Working like a mathematician: structuring a classroom experience

Y7 - Y12, F - Y10, Workshop
Matt Skoss, AAMT, Keynote presenter

This session will model a range of practical classroom approaches that can be used to foster students of all ages working like a mathematician. Resources suitable for your classroom will be shared. Rich lessons will be drawn from the professional learning resource, Maths300, to use as a vehicle to model lessons structures to enable working like a mathematician.

H33 Fractals and chaos theory in the classroom

Y6 - Y10, Workshop
Richard Marks, Waverley Christian College
Jacob Pini, Techxellent

Fractals are infinitely complex objects derived from very simple equations that produce an infinite set of self-similar shapes. Fractal geometry is what is responsible for the realistic textures and shapes in Pixar movies and seemingly infinite virtual universes present in games like No Man's Sky. In this workshop you will learn how to use Scratch and Python to create fractals and other self-similar geometric shapes through a technique called recursion. Once we have generated an interesting set of fractals we will end on a discussion of the wider mathematical domain to which fractals belong: chaos theory which is described by its creator Edward Lorenz in the following words: 'when the present determines the future, but the approximate present does not approximately determine the future.' Please bring a laptop to the presentation.

H34 Data to differentiate: Using Mathspace in your classroom

Y5 - Y12, Repeat, Commercial
Tamara Heaney, Mathspace

We're constantly told about the power of data to improve teaching and identify student learning gaps. But how do we know which data is valuable and how to use it effectively? How can data be obtained without adding complexity to an already busy teaching day? In this session we explore how Mathspace-generated data facilitates teaching. Insights will be shared on how obtaining data via Mathspace has reduced workload, improved what teachers understand about student progress and therefore enhanced student learning. Participants need no prior experience with Mathspace.

SESSION H, Friday, 12.10pm-1.10pm (cont.)

H35 How to do intervention well

F - Y9, Repeat, Workshop
Tierney Kennedy, Qld Association Mathematics Teachers

Kids can actually catch up, but it requires some thinking. In this workshop, teachers will identify costs, benefits and ways forward for the variety of intervention strategies most often used in primary schools. Tierney will also present brand new and highly practical research that show students from years 3-6 growing more than 12 months more than department expectations for every year of teaching across multiple schools. More specifically, this research shows what to do when students display misconceptions during challenging tasks. It shows how to use questioning to get kids to change their own minds and abandon their misconceptions, as well as how to grow new understanding in a way that sticks (effect size of 0.7 above DECD expectations for PAT M each year).

H36 Curriculum created by Kids - CCK (AKA MTQ)

F - Y6, Workshop
Mark Gleeson and Eadaoin Lorigan, Lumen Christi Primary School

A presentation of our experience of differentiated, independent, student created maths projects that are ultimately entered into MAV's Maths Talent Quest (but nevertheless can stand alone without it). During this presentation, we will present how we organised these learning opportunities from Years 1-6 and outline how the students themselves identified what mathematics would be included and highlight the quality of the children's creativity compared to teacher driven lessons. Examples of students' work will be presented, along with support materials that were used to support the students in their learning. We aim to share our successes, challenges and recommendations for developing the idea further. BYO device if you want to download our presentation and resources, which will be provided via a Google Drive folder. Or just a pen and paper to write down the link required.

H37 Imagery: Using images to develop rich tasks in mathematics

F - Y6, Workshop
Fiona Clarke, Mackellar Primary School

How can teachers help students find the beauty in maths? How can we support students to transfer formal mathematical skills and apply them to tasks that are embedded in or resemble daily life experiences?

Students need to be given opportunities to grabble with realistic problems. What if students could 'see' where and how mathematics is required to solve problems in life experiences? What if we could promote mathematical learning through the use of images? This session will provide examples of how images can be used to stimulate learning and understanding across different levels of the curriculum. Participants will be given the opportunity to use purposeful images and create learning experiences for students in their educational context.

H38 Assessing mathematical reasoning

F - Y6, Workshop
Jenny McDonell, Warrandyte Primary School

I want to use the reSolve Inquiry Mathematics resource - Assessing Mathematical reasoning. I will use two of the example tasks from the resource on the site to give teachers the opportunity to use reasoning themselves. I am a resolve champion and as such want to present and promote the great free resource available to all Australian teachers. Reasoning is one of the dour proficiencies which is difficult to teach and assess and this resource based on current research provides teachers with a fabulous free resource that will help them assess the analysing, generalising and justifying skills of their students. It will also provide them with example lessons to continue to teach this skill in differentiated tasks suitable for the whole class.

H39 Using games to engage students in maths

Y5 - Y9, Workshop
Helen Haralambous, The Mathematical Association of Victoria

The MAV Games Days are very popular and a great way of engaging students through competing with like-minded individuals. The games used can also be used as an effective tool in engaging all students. In this hands on workshop participants will trial a selection of games and activities, typical of those used in Games Days. The workshop is for teachers/ schools wishing to run smaller scale Games Days at a local level or school level. All games/activities are applicable to the classroom as tools for engaging all students.

H40 A matter of time

F - Y6, Repeat, Workshop
Margaret Thomas and Phil Clarkson, Australian Catholic University

There is more to the teaching and learning of time than the reading of clocks and calendars. For some students, time is a challenging concept. In my research I identified four major components of time that need to be understood, and the relationships between these components, for deep learning to take place. These components, presented in a framework for the learning and teaching of time, will be explained with practical examples given for teachers in the primary school. This session will also include an explanation of my assessment of students' understanding of time; discuss the question of analogue vs digital clocks; and suggest that there is a real need for some changes to be made to the curriculum at classroom, school and national levels.

H41 Fascinating, captivating and absorbing learners

F - Y12, Workshop
Doug Williams, Mathematics Centre

This is what we all want to do ... and we know when it is happening; but how do we get there and get there more often? In this session we will review output from learners who have obviously been captivated, fascinated and absorbed by their mathematics with the aim of identifying features of the teaching craft and learning environment likely to have brought about these successful experiences. The hypothesis is that by giving these features pride of place in our planning we can engineer these rich and successful learning moments more often.

SESSION I, Friday, 2.30pm-3.30pm

I1 Delivering excellence in financial literacy

Y7 - Y9, Commercial, Workshop
Damian Nicholson, Financial Basics Foundation

Financial Basics Foundation provides free of charge to all Australian secondary teachers, extensive resources and services designed to support students to develop capacity to make responsible and informed financial choices. The Victorian Mathematics Curriculum offers a significant opportunity to use financial literacy as a context for a range of mathematical operations and applications in your classroom. This workshop will focus on exploring ESSI Money, an interactive online game which delivers an innovative app based environment. Students practise a wide range of real life earning, saving, spending and investing transactions, and experience the financial consequences in a safe, fun and challenging way.

I2 Stuck in old loci again

Y10 - Y11, Commercial, Workshop
Neale Woods, Distance Education Centre Victoria

In this 'hands on' session, participants will have the opportunity to learn several techniques for exploring loci using TI-Nspire technology. The workshop will cover inserting an image, geometric constructions of conic sections, the locus tool, the motion controller and data capture. The material presented will use TI-Nspire CAS technology but the material will also be suitable for the TI-Nspire non-CAS version. Note: TI-Nspire CAS calculators will be provided but participants may bring their own TI-Nspire CAS or non-CAS calculator or laptop.

I3 Using Education Perfect to inform your students and your teaching to improve learning in maths

Y7 - Y12, Repeat, Commercial, Lecture
Kelly Hollis, Education Perfect

Education Perfect is an online learning and assessment resource that is aligned to the Australian curriculum. The platform provides over 800 lessons based on the mastery model that explicitly teach the students a specific concept or skill and then ask them to complete a series of questions and activities that allow them to gain mastery in that particular topic. As a teacher you can quickly and easily choose questions and assess individual students or the class as a whole. These assessments are automatically marked and provide you, the teacher, a snapshot of each student's level of ability as well as gaining an overview of the classes' strengths and weaknesses. These tasks can be used for pre-testing, formative assessments, NAPLAN preparation, revision tests and summative assessments. This session is an introduction to the EP platform and an opportunity to learn more about how you can implement the program into your curriculum. Note: Own device needed (laptop, tablet, etc).

I4 Metacognition: reasoning and thinking through problem solving

F - Y7, Repeat, Commercial, Workshop
Marissa Cashmore and Laura Maclean, Banyan Fields Primary School

I have been part of the primary maths/science specialist program in 2016. We will be showcasing two or three rich/open ended problem solving tasks that can be differentiated to cater for students from prep through to early high school (possibly beyond). One of these lessons will be part of or all of a maths300 lesson. During this presentation we will be using questioning and metacognition techniques that will show case students critical and creative reasoning and thinking skills. The aim of our workshop is to have participants walk away with two or three fantastic lessons to try in their own classrooms. However, we are also expecting participants to take away strategies and questioning techniques to use that would allow their students to confidently share their thinking and reasoning in a verbal, visual or hands on way. Pen and paper will be needed for note taking.

I5 Problem solving in primary mathematics

F - Y8, Repeat, Commercial, Workshop
John West, Edith Cowan University

Mathematical problems arise in almost every aspect of students' lives yet few leave school with an appreciation of mathematics as a powerful tool for problem solving. Problem solving in primary mathematics provides a concise introduction to mathematical problem solving. Each chapter explores a specific mathematical problem solving technique. The book contains more than 45 fully worked examples and over 200 problems (complete with solutions), appropriate for students working at a wide range of levels. It is anticipated that this book will be a valuable resource for teachers, parents and students wishing to develop or expand their mathematical problem solving skills. Dr John West is a lecturer in mathematics education at Edith Cowan University in Western Australia. He has worked extensively as a mathematics educator, having taught at primary, secondary and tertiary levels both in Australia, Singapore, Hong Kong and Vietnam.

I6 Learning fractions with Picture Puzzles

Y2 - Y8, Workshop
Doug Williams, Mathematics Centre

This session offers a differentiated, multiple intelligence approach involving seeing, touching, saying and recording fractions in natural language. This approach precedes, and strengthens fluency with, their symbolic form. We will use Cuisenaire Rods in an introductory activity-based discussion, then partners will use Picture Puzzle challenges to explore further. For the exploration partners will need one web-connected device which opens PDF. In this short session we will begin to learn to 'seek the whole' when attempting to solve any symbol or word based fraction exercise. You will also discover that you can make your own Picture Puzzles.

I7 Superannuation - ignorance may be bliss, but also expensive

F - Y12, Repeat, Lecture
Rob Vermay

Financial literacy is a mandated component in the national curriculum but this topic is likely to be directly relevant to your own personal circumstances. This seminar attempts to demystify superannuation to help you understand how it involves you, why you need it and the fundamentals of how it all works. We will discuss choices, access to superannuation funds, taxation, concessional and non-concessional contributions, opportunities and potentially expensive traps, all governed by some important and relevant regulations. This seminar may provide a more substantial background for your teaching. The presenter is not a licensed financial advisor. The only advice offered is that your best investment is likely to be in time to educate yourself.

I8 Continuous and sustained learning for teachers in your school

F - Y6, Workshop
Lee-Anne Pyke

Ensuring that there is a consistency of high quality of teaching across a school is one of the greatest challenges of a leader. Explore how leaders can ensure professional learning in mathematics has a direct and positive impact on student learning outcomes. Examples of achievable, school- based professional learning programs that focus on collaborate practices will be highlighted. A framework of key questions a leadership team should address to maximise their investment in professional learning will be presented.

I9 Encouraging independent learning by increasing literacy in VCE Further Mathematics

Y10 - Y12, Repeat, Workshop
Rod Williams and Deb Murrell, Lavalla Catholic College

Noting that many students did not understand what a VCE Further Maths question was asking, it was decided to work with the students' literacy and other soft skills in Unit 1 with the intention to improve independence, confidence and motivation in maths as they progressed through VCE. Students were encouraged to perform analyses of questions to determine the skills involved and then if any given question required a one stage, two stage or multi stage approach. Supplementary literacy techniques (such as compare and contrast) were also used for key concepts. Students worked with text and VCE past exam papers and created a taxonomy of questions. As a result, students choose which questions they need to complete to consolidate a specific skill or technique. This presentation is a tour through our journey into working on literacy in a VCE mathematics classroom and participants are invited to share their experience of this.

I10 UDFs and widgets in VCE Specialist Mathematics

Y12, Repeat, Workshop
Chris Ireson, Melbourne High School and Texas Instruments T3 National Instructor

See how easily User Defined Functions(UDFs) and widgets can be used on the TI-Nspire CX CAS calculator to aid your students and save them time in the VCAA Specialist Mathematics Technology Active examination. You will be shown how to write your own UDFs and widgets and given some prepared ones to try for yourself. Please bring your TI-Nspire CX CAS calculator.

I11 Using teamwork to motivate students in the classroom

Y5 - Y12, Repeat, Workshop
Joseph Wright, The Educational Advantage P/L

Human competitiveness is a natural driver for most of us, and working in a team harnesses that drive in a non-threatening way. Achieving a goal as part of a team is a rewarding experience. Encouraged by teammates, students become more engaged in an activity, and as a result they learn more efficiently. Interestingly, the ability to work in a team is a powerful predictor for success in the workplace. Join us as we share some practical ideas that use teamwork in a group learning activity that also allows for recognition of individual contributions. Bring a laptop or a tablet.

SESSION I, Friday, 2.30pm-3.30pm (cont.)

I12 Teach Excel-ent maths

Y7 - Y9, Repeat, Workshop
Robert Money and John Widmer

The *Quantitative Skills in 21st Century Workplaces* Report identified 'a need to identify and take opportunities to embed work-related technologies — particularly spreadsheets — across school curricula'. In response, we will discuss spreadsheet use in our Years 7 to 9 mathematics and the wider STEM implications. Examples range from the simplest 'Find My (Linear) Rule' activity to spreadsheet analysis of large 'real data' sets downloaded from data loggers. Bring your ideas to the session. Check out http://mag-net.org.au/mavcon/ for more detail. Prior familiarity with the Excel spreadsheet is NOT a pre-requisite for this session.

I13 Taking a look at formative assessment practices in primary school mathematics

F - Y4, Repeat, Workshop
Alex Box and Sam Collier, Maths Pathway

This session looks into current uses of formative assessment in primary school mathematics learning and the challenges of embedding formative assessment into everyday instruction in a sustainable manner. It will take a look at what the research says about formative assessment, its role in providing differentiated instruction and strategies for embedment into the curriculum. It will also consider the implications of a growing research and evidence base around how specific forms of assessment impact learner mindsets. Attention will turned towards how we are currently using assessment to inform differentiated mathematics instruction in Australian primary schools. What's currently working in schools? What challenges or roadblocks prevent ongoing, effective use of data to inform instruction? How do current practices reflect and fit with the research?

I14 Strengthening the maths teacher blogging community in Australia

F - Y12, Workshop
Oliver Lovell, Sunshine College
Michaela Epstein, The Mathematical Association of Victoria

A blog is 'a regularly updated website or web page, typically one run by an individual or small group, written in an informal or conversational style'. In other areas of the world such as the UK and US there are very strong blogging communities around mathematics teaching. They act as online spaces for passionate teachers to learn from each other, share ideas, and collectively solve problems. The goal of this workshop is to bring together mathematics teachers who blog, would like to learn to blog, enjoy reading teacher blogs, or are just generally interested in how a greater engagement in reading or creating blogs could be a valuable professional development exercise. The workshop will be in three main phases. 1) Current state of Aussie maths teacher blogging, including sharing those in the room, 2) Questions, 3) Next steps/how to start blogging/how can we support new bloggers? Ollie blogs at: www.ollielovell.com, Michaela blogs at: https://michaelaepstein.wordpress.com.

I15 Creative and critical thinking at Camberwell High School

Y7 - Y10, Repeat, Lecture
Geoffrey Menon and Ursula Parker, Camberwell High School

A presentation in two parts. First part is about Year 9 mathematics where we use problem solving to begin with the end in view and present basic techniques (such as the Pythagorean theorem and trigonometry) as smaller parts in the solving of larger problems. The second part of the presentation covers the use of open-ended mathematical investigations in assessment in a Year 10 optional mathematics subject.

I16 Developing and assessing and algebraic thinking

Y4 - Y9, Repeat, Lecture
Max Stephens and Cath Pearn, The University of Melbourne (MGSE)

In the upper primary and junior secondary years, the Victorian Curriculum places a strong emphasis on the development of students' algebraic thinking through their experiences with number patterns and relationships starting in the early years. Other key ideas that support algebraic thinking are equivalence using the four operations, patterns and relationships involving whole numbers, decimals and fractions, and generalisation. This session will present several recently developed assessment instruments that have been used extensively with Victorian students, but also in other Australian states. These assessment tasks draw attention to the importance of fostering and developing students' algebraic thinking as an essential part of the mathematical proficiencies of reasoning and problem solving. These tasks can and should be used to guide teaching and learning in regular classrooms to develop and support student's algebraic thinking, and can also be used for staff professional learning in this important area of the curriculum.

I17 Flipping the maths classroom for EAL learners

Y10 - Y12, Workshop
Bernadette Mercieca, RMIT Training

The aim of this presentation is to explore how using a flipped classroom in mathematics might be particularly useful for senior EAL students to promote their learning. This is an important area to consider, with the increasingly multicultural nature of our classrooms and with the rise of new technologies that allow students opportunities to view electronic material before coming to class. DeGrazia, Falconer, Nicodemus and Medlin, (2012) found that students supplied with optional video lectures came to class much better prepared than when they had been given textbook readings or homework. There will be a hand-on component to this presentation where participants will explore online options for flipping the maths classroom as well as possibilities for locally based materials.

I18 Arithmagons with Scratch programming

Y7 - Y9, Workshop
Sanjin Dedic, Techxellent
Meg Pini, G.A.T.E.WAYS Gifted and Talented Education

An arithmagon is a triangular network graph where the value of each edge has a specific relationship to each node. They can make for rich extension activities that will engage the higher order thinking skills of your middle school students and that make clear links between simple mathematical problems and complex computational thinking. In this session we are going to take you on a problem solving journey where we tackle arithmagons first with an iterative trial and error approach, then once an arithmagon is solved we can try to derive a formula for the value of each node, finally we are going to turn to Scratch programming to put both of these approaches into the form of code. Given no limitation on the types of relationships that we can assign between nodes and edges, we can easily create a problem sets appropriate for students widely ranging in ability. Please bring a charged laptop, you will need to use an online or installed version of Scratch.

I19 My students don't know their tables!

Y5 - Y9, VCAL, Commercial, Workshop
Michael O'Reilly and Norrian Rundle, Norrian Michael Maths Education

Too many students in the middle years do not have automatic recall or even efficient strategies to work out the multiplication facts. Too often, students resort to counting on their fingers, using the 'tables' on the back of their exercise book or calculators.

This session will look at an alternate representation of the 'times tables', with associated efficient strategies for learning the multiplication facts. In this option you will be shown how to effectively teach the multiplication facts to middle years students who do have automatic recall. Excel spreadsheets will also be provided that enable targeted practise using efficient strategies. Although this is a commercial session, the ideas and teaching strategies covered in this session can be implemented in your classroom without purchasing the Times Tables Strategies app from the Apple Store. Bring along a USB stick for take home resources.

I20 Numbers and nerds: exploring maths in the media

F - Y12, Repeat, Lecture
Jennifer Hall, Monash University
Michael Minas, Williamstown North Primary School

In this session, we will present findings from a research-practice partnership in which Jennifer conducted academic research about representations of maths and mathematicians in children's media, and then Michael explored the same topic with his class of Year 5/6 students. We will share our findings from the two projects, including examples from popular media sources such as The Big Bang Theory, The Simpsons, and the Harry Potter series. This presentation will address the importance of media representations in shaping students' views of and attitudes towards maths and mathematicians, as well as towards themselves as learners of mathematics. Finally, we will also share some practical suggestions for implementing a similar project with your own students.

I21 Making 'we just don't know' accessible and beautiful

Y7 - Y12, Repeat, Lecture
Andrew Crisp, Mathspace

Mathematics can sometimes feel set, like concrete - questions have an unambiguous, well-known answer, and have been answered by legions of students before them, each chasing the tick and fearing the cross.

The unsolved areas of mathematics are not all high up the ivory towers of expert, career mathematics. The frontier, where the best anyone can say is 'we just don't know', is often right beneath our feet!

This talk will present a rationale (with examples and advice) for introducing unsolved problems in your high school classroom. From moving a sofa around a corner to Goldbach, four fours to Collatz, the enormity of large numbers, and

SESSION I, Friday, 2.30pm-3.30pm (cont.)

more. These problems possess a unique ability to inspire exploration and creativity in students, solidify understanding throughout the curriculum as a whole, while teaching them (and you!) the power, the limits, and the beauty of mathematics.

I22 Topic starters

Y5 - Y10, Repeat, Workshop
Mike Clapper, Australian Mathematics Trust

Student disengagement from mathematics is an ongoing problem. This problem is significantly reduced if students are introduced to each topic in an engaging way which they can relate to their own experience and which justifies the acquisition of the technical skills required to make progress. This workshop will present a variety of well-proven topic starters but will also invite participants to present their own ideas, so it will be a sharing session.

I23 Activities for exploring maths concepts

Y7 - Y10, Repeat, Commercial, Workshop
Vanessa Rule-Paddle and Julian Lumb, Pearson

This is a practical session in which you will have the opportunity to engage with and explore activities that are designed to support students to develop and practice reasoning and critical thinking skills. The activities are designed to allow students to 'play' with mathematics by exploring concepts through discussion, using multiple approaches and strategies, by justifying their thinking and by reflecting on their learning. It will also explore how simple and effective use of technology can give immediate feedback, deepen conceptual understanding and make mathematics come to life for learners. While this session is suitable for Years 7-10 mathematics, the pedagogy explored is applicable to other year levels.

I24 What order should I teach topics in?

F - Y6, Repeat, Workshop
Tierney Kennedy, Qld Association Mathematics Teachers

Sometimes it seems that by the time we come to teach a new concept, kids have forgotten everything else! Some concepts are really important in maths, but others don't matter quite so much. In this session, teachers will consider all of the different content in maths that we usually teach in primary school, and will create a sequence starting from developing the concept of quantity in Prep all the way through to complex algebraic thinking in Year 6. Teachers will examine the connections between related concepts, particularly linking concepts with key ideas in number. They will also consider the precursors for teaching each topic, what can be taught simultaneously, and what needs to come later in the year. Come along prepared to be actively involved, and bring a phone to take photos.

I25 Panel discussion: can technology improve student learning outcomes?

F - Y12, Lecture
Craig Blake, Mathspace
Andrew Musgrave, Haileybury

This open question in mathematics education is more important than ever. This panel will explore both sides of the debate, focussing on student attitudes and performance. The panel discussion will explore:

How can teaching adapt to the digital age? Should it? Do online resources encourage lazy pedagogy? How should student engagement with online mathematics content be measured? What does effective teaching look like in an online environment? Does higher engagement in online learning translate to deep understanding? Should education be entirely online? What equity concerns does online education relieve and exacerbate? What parts of mathematics fail to translate in online environments?

Expect a lively and heated exchange!

I26 Transition from fully differentiated to VCE

Y9 - Y11, Repeat, Lecture
Jenny Sutton, Lavalla Catholic College Traralgon

The challenge for schools delivering a fully differentiated mathematics program, using tools such as Maths Pathway, is the transition to VCE. Lavalla Catholic College has been using this learning model since 2014 and has developed a Year 10 program that allows students to transition to the requirements of VCE mathematics. In this session, Jenny will share her experiences and give the opportunity for discussion.

I27 Using problem solving to create differentiated learning experiences

Y5 - Y8, Repeat, Commercial, Workshop
Pauline Kohlhoff and Anne Prescott, Australasian Problem Solving Mathematical Olympiads (APSMO) Inc.

In this workshop, we will explore how a well constructed problem can be used for teaching students who are at different stages of mathematical development, and who may exhibit different levels of mathematical achievement and confidence in their own abilities. Questions from the Australasian Problem Solving Mathematical Olympiads and

Maths Games will be used as the basis for classroom activities for students in Years 5 to 8.

The aim is to support a variety of solution strategies and further mathematical inquiry, to enhance differentiation in the teaching and learning of mathematical concepts.

APSMO Inc. is a not for profit organisation. This session is open to all teachers with an interest in problem solving. Participation in APSMO programs is not assumed.

I28 HITing up the maths classroom: improving student outcomes with HITS

Y7 - Y12, Repeat, Workshop
Geetha Rangarajan and David Chew, Wellington Secondary College

The DEECD has introduced High Impact Teaching Strategies (HITS) as an effective way of improving student outcomes. This workshop provides hands on activities that utilise different aspects of HITS. The participants will be given opportunities to understand what HITS are and how they can use simple activities to promote deeper thinking among their students and thus improve student outcomes. Please bring your computers.

I29 Worthwhile CAS calculator use in this year's second Methods exam

Y10 - Y12, Repeat, Workshop
Kevin McMenamin, Mentone Grammar

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 its workings. 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. Bring along your CAS calculator and a copy of the exam if available. Some Casio ClassPad calculators will be available for loan.

I30 Mathematica case-study, Year 9 Melbourne Girls Grammar

Y4 - Y9, Repeat, Workshop
Ian Willson, Independent teacher/consultant
Faina Brichko, Melbourne Girls Grammar

Participants in this workshop will be shown some of the work done in semester 1 this year at MGGS, where year 9 students embarked on a series of collaborative activities in the use of Mathematica and the Wolfram Language—with a focus on linear relations. You will see how students were presented with challenge and discovery tasks with little or no previous experience with the software. A subsequent student project will be discussed, with a focus on both easily managed and more difficult ideas, concepts and Wolfram Language functionality. You can expect to take away ideas, activities and tools for use in your own classroom, and some reflection on matters to do with the introduction of Mathematica/Wolfram Language as a CAS technology tool. For most effective participation a laptop with Mathematica software already loaded is desirable (no computer lab facilities are available).

I31 Leading a changing maths culture

F - Y6, Repeat, Workshop
Amy Backas, Morang South Primary School

A journey undertaken by a small leadership team in identifying, analysing, shaping, influencing and changing a whole school culture around maths. Morang South Primary School began this journey five years ago around shaping our future maths culture to suit the needs of 21st century learners. After undertaking Bastow's Leading Maths in 2017 this journey has started to have a significant impact on our data, attitudes and perceptions around maths. This presentation will cover how to begin this process, ways of uncovering attitudes (students, teacher and parent community) and how to track the shift over an extended period of time. This is a must for schools who are in the processes of shifting their maths culture.

I32 Challenge, persist and share

F - Y6, Repeat, Lecture
Stacey Lamb, St Bernard's Primary School Wangaratta

With the right amount of challenge, a positive mindset and the platform to share their learning and engage in ideas and strategies, students can learn at a high level. Hear about the success of challenging mathematics pedagogy, students positive mindset in mathematics and how students sharing ideas and their learning has changed the mathematics classroom.

SESSION I-J, Friday, 2.30pm-4.40pm

I-J1 Inspiring Further Math students: recursion and financial maths

Y9 - Y12, Repeat, Commercial, Double Session, Lecture
Craig Bauling, Wolfram Research

Craig Bauling will present on using Mathematica for Further Mathematics core recursion and financial modelling. He will provide functionality and sample solutions to a range of past exam questions, showing how Wolfram|Alpha and Mathematica (tools freely available to all Victoria students and teachers) can be used to inspire and engage your teaching. You should come prepared with Mathematica loaded onto your computers. Instructions at: www.education.vic.gov.au/about/programs/learningdev/vicstem/Pages/wolframsoftware.aspx.

I-J2 Informatics: challenging, inspirational and relevant coding

Y7 - Y12, Repeat, Double Session, Lecture
Jan Honnens, Christ Church Grammar School

At Christ Church Grammar School we have over the last few years built a culture of enjoyment and excellence in informatics based on lunchtime sessions, informatics coding camps and a year-round involvement in computer programming competitions. Informatics, a mix of computer programming and mathematical thinking, has become a key motivator for many of our student and has helped them unleash their potential in both computer science and mathematics. In this session we will have a look at our Informatics Club model and discuss a solution (in Python) to a problem from each of the eight computer programming competitions that we use. We tirelessly encourage our student to be active learners and attempt the problems before we share a solution with them. Similarly, for this session we offer you the opportunity to have a go at the problems before we give away the solutions! The problems are available at http://tinyurl.com/8problems. Please bring a laptop with Python installed (e.g. IDLE from python.org).

I-J3 Real-world data analysis using Google Sheets

Y10 - Y12, Repeat, Double Session, Workshop
Nazim Khan, St Mary MacKillop College

Google Sheets and eeal-world data will be utilised to demonstrate the concepts in univariate, bivariate and time series data analysis. This will allow an opportunity for participants to explore the real-world applications of the concepts covered in Years 11 and 12.

Key concepts include:

- Construction of dot plots, stem plots, bar charts, histograms, and box plots.

Construction of scatter plots (with line of best fit and least squares regression equation), residual plot, normal probability plot, two-way frequency table, segmented bar chart, and parallel boxplots. Calculations of correlation coefficient, and coefficient of determination.

- Participants to bring along a laptop or any device that can access Google Sheets. Laptops will be convenient to work with.
- Calculation of measures of centre, spread, and 95% CI.

Construction of time-series plot, smooth time series data by using a simple moving average, calculate seasonal indices by using the average percentage method, deseasonalise a time series by using a seasonal index, fit a least-squares line to model long-term trends in time series data.

SESSION J, Friday, 3.40pm-4.40pm

J1 Further Maths exams: using the CAS calculator efficiently and effectively

Y10 - Y12, Workshop
Kevin McMenamin, Mentone Grammar

This session will look at questions from this 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.

J2 Quick is the aim, smart is the gain

Y5 - Y8, Repeat, Commercial, Lecture
Helen Barker, Numurkah Secondary Col

QuickSmart is a numeracy interventio nat is offering 4th phase intervention (o es a last chance intervention), to studer ears 5 and 8. It improves middle school stu aticity with simple maths operations, such a s; this frees up working memory to enable th process more complex mathematical com

At Numurka College we are now in our fourth year usin mart program. NAPLAN and PAT testin improved scores when compared to the co he 6's component of the program has been used op Year 12 students to improve their ability to discriminate which skill to use and to interpret multifaceted exam questions.

J3 Mathematica basics: get started!

F - Y12, Workshop
Ian Willson, Independent teacher/consultant

This workshop will provide an introduction and suggested activities for those yet to start using Mathematica and the Wolfram Language as a CAS technology tool in their classrooms. Areas covered will include:

basic arithmetic and algebra command; visualisation tools (including ListPlot and ListLinePlot), idea of an ordered pair in a cartesian axis system, generation of sets of ordered pairs with the Table function; use of the Plot function to draw graphs (and Options to enhance output); use of the Manipulate function to create animations for the investigation of the behaviour of families of functions (polynomials and others); introduction to Graphics 2D and 3D primitives. For most effective participation a laptop with Mathematica software already loaded is desirable (no computer lab facilities are available).

J4 Get your hands on hand-on tasks

Y2 - Y10, Workshop
Doug Williams, Mathematics Centre

In March 1977 the first hands-on problem solving task centre opened at Campbell Primary School, ACT. Since then tasks have always been part of mathematics learning in schools somewhere in Australia. Many, many teachers have contributed to the teaching notes other extensive support for using tasks which is available through Mathematics Centre. The eTask Package is the latest evolution of this work. It provides everything you need to make your own tasks from your own materials. Find out why you might bother, how easy it is to do and how the process can be the focus of in-house professional development.

J5 Creating critical thinkers

Y4 - Y9, Workshop
Stephanie Grenfell and Shelley Clancy, St Joseph's Primary School Cobram

This session will cover how we have changed our teaching practices to include more opportunities for rich learning, critical thinking and problem-solving. See how we have overcome the challenges of introducing more rich tasks, while still meeting every student's point of need. You can take some practical strategies back to the classroom, with some of our favourite energisers for the beginning of lessons that have multiple points of entry.

Changing the way we teach has helped us equip our primary students with 21st-century skills, which they can take through to their higher levels of schooling at our feeder secondary schools.

J6 Teaching strategies for Further Maths

Y11 - Y12, Repeat, Lecture
Celeste Pryke, Christian College Institute of Senior Education

After five years of attending the MAV conference, the way I teach Further Maths has changed significantly. I have moved away from 'chalk and talk' and into pedagogy that is based on research and the best practice of many inspirational speakers at the MAV conference. I will share my experiences and the teaching strategies that work in my classroom, along with

SESSION J, Friday, 3.40pm-4.40pm (cont.)

some of the research behind the strategies. Simple ideas such as warm-up questions, preparation videos, spaced practice and Guttman charts can reinvigorate your teaching. This session would be great for new Further Maths/General Maths teachers or teachers who are looking for something new to try in their classroom.

J7 An interactive statistical sampling activity with chocolate

Y8 - Y12, , Lecture
Anthony Morphett and Jennifer Palisse, The University of Melbourne

We will present an activity that engages students with key statistical ideas – including sampling, bias, variability and estimation – using virtual blocks and real chocolate. The activity provides an experiential foundation for building understandings of important statistical concepts, produces data which are meaningful to students, and it is a learning task that allows for multiple entry and exit points. Furthermore, it can be tailored for year levels 8-12 and class sizes from 20 upwards. The activity is easy to implement, supported by good documentation and freely available on the web.

Note: This is a repeat of the same session from MAV 2017. Please bring a laptop, tablet or mobile device if possible.

J8 From print to digital: our free maths textbook

Y3 - Y12, Repeat, Commercial, Lecture
Andrew Crisp, Mathspace

Are you planning to transition to digital resources? Mathspace has partnered with Westpac to make their online digital textbook, Mathspace Essentials, free for all Australian schools.

This is a comprehensive online resource which is mapped to the Victorian curriculum for Year 3 to 12. With thousands of topics and video lessons, as well as step-by-step support on practice questions, students can learn through interactivity for free. This session is for anyone interested in learning how to use this free resource in the classroom. Andrew will take you through some great examples of content, including topics and investigations for offline classroom activities. Participants need no prior experience with Mathspace.

J9 Embedding Maths 300 resources in secondary maths programs

Y7 - Y10, Commercial, Workshop
Helen Haralambous and Danijela Draskovic, The Mathematical Association of Victoria

During this session, Helen and Danijela will explore a handful of rich and challenging Maths 300 tasks, appropriate to secondary Maths classes. Participants will develop their knowledge of navigating the Maths 300 resources and will trial hands on-tasks that provoke mathematical thinking. Participants should be prepared to test and justify their understandings as well discuss and justify the merits of engaging learners in meaningful and authentic tasks. Laptop needed.

J10 Increasing exploration and number in Prep

F - Y1, Workshop
Michael Bairstow and Sarah Campbell, St. Dominic's Primary School

Early in this school year the prep team at St Dominic's were concerned about the basic number knowledge and skills of many of their students. Worried about how they could possibly focus on this and still teach the curriculum the team engaged in some professional development and implemented a new plan. The major changes were a greater focus on exploration and a daily number task. This session will outline the journey the team went on and share some of the most successful explorations and number activities used during the year.

J11 STEM resources from reSolve: maths by inquiry

Y7 - Y10, Lecture
Kaye Stacey and Lucy Bates, Australian Academy of Science

This presentation will introduce participants to several new STEM resources that have special relevance to teaching mathematics. All resources are freely available from www.resolve.edu.au. Units can be taught separately or put together to make a coherent multi-year program. Year 7 and 8 topics include the mathematics of motion and of music (including conducting experiments to gather, plot and interpret data). There is a series of five units that develop skills in modelling the real world, using contexts such as wait times for theme park rides, designing packaging, analysing statistics on risk and accidents, and vehicle cornering. Three units use coding to explore data visualisation, patterns in nature and

simulating games. The reSolve: Mathematics by Inquiry is an initiative of, and funded by, the Australian Government Department of Education and Training, through the Australian Academy of Science and Australian Association of Mathematics Teachers.

J12 Learning goals

F - Y9, Workshop
Laura Boylan and Kate Lachmund, Tarneit P-9 College

Learn how to draw upon current practices in data collection to create specific and targeted learning goals in Mathematics and how these goals can be implemented from Prep to Year 9. Kate and Laura share their journey from 'maths goals many and any way' to developing strategic and personalised goals, linked to quality teaching practice and how they changed mathematics for students and teachers.

J13 Engaging in geometry - critical for STEM

Y4 - Y9, Repeat, Workshop
Marj Horne, ACU

Come and explore some engaging activities for geometry using easily accessible materials. These activities are linked to an evidence based geometry framework across the middle years of schooling. Targeting teaching for these students to help them think mathematically and catering for the diversity of experience within any classroom can be done easily using any of these tasks. Evidence from international studies is that Australia lags behind the rest of the world in geometry. We can make a difference to the students' futures helping them to more easily access STEM through tasks that are fun and easy to use but that focus on the important big ideas in geometric thinking. It would be useful for delegates to have some A4 paper, a ruler and a pencil.

J15 Let's get started! Using games to promote fluency and reasoning

F - Y6, Workshop
Jade Seddon and Jen Briggs, Derrimut Primary School

Teachers will be elbow deep in dice and cards during this workshop. The session will focus on developing mathematical fluency and reasoning in students through the use of hands-on and engaging card and dice games. Teachers will be armed with a range of activities and we will explore how to easily differentiate for a range of student learning needs.

J16 Modelling motion: putting mathematics into middle years STEM activities

Y5 - Y7, Repeat, Workshop
Susie Groves and Brian Doig, Deakin University

Modelling motion is a special topic in the Australian Academy of Science/Australian Association of Mathematics Teachers funded reSolve: Maths by Inquiry project. This inquiry based unit comprises seven lessons focussing on modelling a variety of different motions with mathematics, using contexts such as rolling balls and falling objects. Students experience the power of mathematics in STEM activities and build their mathematical modelling skills. This workshop will provide an overview of the unit and give participants hands-on experience with materials and activities.

J17 Algorithmic thinking across primary years

Y2 - Y6, Workshop
Jennifer Bowden and Judy Gregg, The Mathematical Association of Victoria

Algorithmic thinking provides opportunities for students to follow and create a well-defined set of instructions to perform a task or solve a problem. We often focus purely on numbers, without linking algebraic problem-solving skills. Promoting algorithmic thinking encourages and increases students' ability to solve problems using different strategies. This workshop will demonstrate lesson from Year 2 to Year 6 that challenge students with the opportunity to explore algorithmic thinking. These lessons have been successfully used in classrooms and will be available online through the MAV website with enabling and extending prompts.

J18 The use of non-examples to promote critical thinking in the early years

F - Y2, Repeat, Workshop
Kate Copping, The University of Melbourne

In the Early Years (Foundation – Level 2), the Victorian Curriculum in Critical and Creative thinking, 'focuses on developing the knowledge, skills and understanding to express reasoning and to problem solve and learn more effectively' (VCAA). This session examines the use of examples and non-examples in teaching mathematical concepts. When learning mathematics, students are usually shown only correct examples of how to solve problems or identify shapes or patterns. However, the use of non-examples can help develop critical thinking skills by challenging students' beliefs and reasoning. This can enable teachers to address misconceptions and for students to better clarify their own conceptual understanding in mathematics.

SESSION J, Friday, 3.40pm-4.40pm (cont.)

J19 Creating challenging problem solving tasks for all students

F - Y6, Repeat, Workshop
Michael Minas, Williamstown North Primary School

In this workshop, we explore how to plan and present challenging problem solving tasks that will engage all of your students, from the most reluctant to those who are extremely confident problem solvers. We will look at the ways in which the cognitive challenge for each individual student can be increased by outlining some simple steps that will help teachers write effective enabling and extending prompts. The factors that impact on engagement will also be discussed, with a focus on how challenging problems can be used to stimulate student motivation.

J20 Technology: classroom asset or distraction?

Y7 - Y12, Repeat, Lecture
Daniel Smorgon, Mathspace

Technology has transformative potential in the classroom, but many teachers are concerned that devices have become a distraction rather than a classroom lesson enhancer. How can we capture the attention of easily distracted students when they're using devices? In this session we explore what causes lapses in student motivation. Study skills expert, Dan Smorgon, will share some simple strategies teachers can consider to improve the productivity of students whilst they use learning technology on devices in the classroom and at home. He will also give attendees a 'tools and strategies for staying focused online' kit to hand out to students.

J21 Data to differentiate: using Mathspace in your classroom

Y5 - Y12, Repeat, Commercial, Workshop
Tamara Heaney, Mathspace

We're constantly told about the power of data to improve teaching and identify student learning gaps. But how do we know which data is valuable and how to use it effectively? How can data be obtained without adding complexity to an already busy teaching day? In this session we explore how Mathspace-generated data facilitates teaching. Insights will be shared on how obtaining data via Mathspace has reduced workload, improved what teachers understand about student progress and therefore enhanced student learning. Participants need no prior experience with Mathspace.

J22 Flexible numeracy learning in the primary setting

Y1 - Y6, Repeat, Workshop
Michael Gerber and Janis Mesiti, Truganina South Primary School

Whilst the foundational numerical concepts remain the same, the way in which the content is delivered to students is forever evolving. The learning needs within the classroom stretch further than they ever have. The need to differentiate to cater for all students is paramount. The exploration of co-teaching, differentiation, open-ended tasks and elements of visible learning can assist in reclaiming the classroom and ensuring that all students are working at their point of need.

In this session, pedagogical coaches who have worked with teachers from Foundation to Year 6 will present ways they have used twenty-first century teaching and learning practices to develop teacher competency and improve student outcomes. You will hear examples of how teams of teachers and coaches have collaborated in planning and in the classroom to maximise the potential of a variety of co-teaching options and flexible student groupings.

J23 Fun and games in VCE maths

Y10 - Y12, Repeat, Workshop
Rosalind Willsher and Sharon Darling, St Augustine's College, Kyabram

The VCE maths studies are all very full and there's not a lot of spare time as we all struggle to complete our courses. However, this doesn't mean there isn't time for a little fun along the way, as long as we are learning as we play! In this session we will share some of the fun we have and the games we play in our classes as we tune into lessons, consolidate new ideas, break up long double periods and cater for our hands-on and active learners. Whether you teach Year 11 General or Year 12 Specialist, fun is always good.

J24 Beyond just content: using the maths proficiencies to develop skills for the future

F - Y6, Commercial, Workshop
Cassandra Lowry, Australian Mathematical Sciences Institute (AMSI)

Teaching isn't easy. On one hand we want to develop enthusiastic, future-ready students who are engaged with their learning and can apply their knowledge to a range of situations and problems. On the other hand, sometimes we would just be happy if students could remember the strategy we showed them last week. How can we balance the need

to deliver content, while at the same time develop skills in students, such as problem solving, critical thinking and communication, that we know will help them in the future? This workshop will attempt to answer this question by helping participants take a fresh look at the often-underappreciated maths proficiencies. It will provide examples of how the proficiencies can be incorporated into lessons and how such steps can benefit not only the development of students' content knowledge, but also the development of skills that will help them beyond their time in the classroom.

J25 Take a chance on me!

Y4 - Y9, Repeat, Workshop
Lewis Gunn and Thi Pham, Red Cliffs Secondary College

This workshop presents our implementation of an inquiry based teaching approach with an emphasis on constructivism and reflection in middle years mathematics and the benefits this has had for the engagement and learning of all our students, particularly for those who were previously disengaged from their learning. In the Year 8 probability unit of work, students utilise an inquiry based approach to create their own board-games. Ensuring that the games are successful and fun to play requires a deeper and more meaningful understanding of the real-world impact of probability than is often achieved in the traditional, textbook learning approach. In addition to reviewing the inquiry based approach, workshop participants will have the opportunity to design, play and evaluate their own probability based board-games and then consider how the reflection process can be used to further develop students' understanding in the maths classroom.

J26 What is mathematics?

Y5 - Y10, Repeat, Workshop
Karim Noura, Melbourne Polytechnic

In this presentation, teachers will share ideas and experience on teaching and learning Mathematics. By using and sharing practical examples, we will be able to answer the following questions:

Q1 What is Mathematics?

Q2 Why do we learn and teach mathematics?

Q3 What do we teach at schools and universities?

Q4 What strategies do we use in teaching mathematics?

Q5 What kind of activities do we use to enhance the teaching and learning of mathematics.

In my presentation, I will focus on:

- Teaching mathematics with problem solving approach
- Linking what we teach in the classroom to real life situations
- Leading students to further study.

J27 Learning how to reason in junior secondary - scaffolding mathematical reasoning

Y7 - Y8, Repeat, Commercial, Lecture
Carolyn Smales and Brad Gaylard, Firefly Education

Many classroom teachers equip their students with strategies for interpreting and unpacking mathematical problems, however less time is given to the 'how to' of reasoning. Reasoning skills do not come naturally to many students, and need to be modelled and scaffolded for them. What exactly do we mean by 'justify your answer'? or 'explain your method'?

In this presentation, teacher and author, Carolyn Smales, will demonstrate how simple mathematical reasoning questions can be used to build a bank of reasoning skills. She will present problems that stimulate and challenge mathematical thinking, and demonstrate how to use problems to unpack the cognitive skills that students need to become proficient reasoners.

She will also show how these principles have been applied to Bit Maths - a forthcoming secondary maths program, which employs a Reasoning Wizard to explicitly guide students through the cognitive process of unpacking reasoning questions.

J28 Algorithms for partial fractions

Y10 - Y12, Repeat, Workshop
Steve Hu, Eltham College

There are some traditional methods to resolve proper fractions into a sum of partial fractions. Finding the coefficients relies on solving a set of simultaneous equations in the traditional methods. The process of solving the set of simultaneous equations often involves very complicated calculations. This presentation will provide alternative ways to quickly resolve partial fractions for a few types of algebraic fractions. More general forms of algebraic fractions can be reduced to those forms.

SESSION J, Friday, 3.40pm-4.40pm (cont.)

J29 Mathematician Monday: the story behind the numbers

Y7 - Y10, Repeat, Lecture
Ryan Martini, Yarram Secondary College

Through the exploration of a different mathematician each Monday, students are introduced to the wacky and wild characters that have created and discovered the principles and concepts that every student learns today. From the Pythagorean who was thrown off a boat for believing in irrational numbers, to the brilliant 20-year-old who was shot for love, the story of mathematics is full of bold and daring personalities, as well as a large number of interesting discoveries to accompany them. In this presentation, we'll go through a number of slides dedicated to everyone from Florence Nightingale (funny pie charts) to Leonhard Euler (doodling with Euler's formula), and show how their stories, alongside related activities or formulae, can be used as a hook at the beginning of a week of mathematics.

J30 Visual strategies for fractions, decimals and percentages

Y3 - Y8, Repeat, Workshop
Christine Lenghaus, Huntingtower School

Seeing is believing. Stop telling, start showing.

The teaching visual strategies to students to enhance understanding of fractions, decimals and percentages workshop provides a systematic process and variety of visual strategies, focusing on matching visual and symbolic representations, which is the way any language is learned. The content is material I have used or developed in my classroom.

In this workshop, delegates will experience the powerful impact that learning via the use of visual techniques can have when teaching fractions, decimals and percentages in a maths classroom.

- Gain an understanding of how visual strategies work when teaching maths to students.
- The systematic, logical sequence to teaching fractions, decimals and percentages that builds on your student's knowledge.
- When to choose additive thinking, multiplicative thinking or proportional reasoning.
- How to progress from numbers to fractions, decimals and percentages using visual strategies.

J31 A critical analysis of the use of effect sizes to judge impact

Y7 - Y12, Double Session, Workshop
George Lilley, Box Hill Senior Secondary College
Marcel Van Otterdyk, Strathmore SC

We will look at the various ways effect sizes are calculated and ranked. Specifically we will look at John Hattie's Visible Learning and the problems of comparing effect sizes from different studies. We will also look at the specific studies Hattie used to calculate effect sizes. In particular, we will look at the studies for 'worked examples', 'class size', 'reducing sisruptive behaviour', 'self-report grades' and 'welfare'. We will give delegates the option to decide which studies we use. We are sure you will be very surprised at what you find! We will provide electronic copies of the studies to view and read on your computer.

MAV MEMBERSHIP

YOUR PROFESSIONAL ASSOCIATION

THE MATHEMATICAL ASSOCIATION OF VICTORIA

By joining MAV you become a member of an innovative teaching association for maths educators. MAV supports its members by working with experts including leading academics, education consultants, exemplary classroom teachers, the Victorian Department of Education, and industry partners to provide professional learning, resources and advocacy in the interests of members and the wider community.

MAV has members from all education segments including early childhood, primary, secondary, VCAL and VET, and tertiary.

VALUING MATHEMATICS IN SOCIETY.
The MAV is a membership driven association which provides a voice, leadership and professional support for mathematical education.

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)

BENEFITS INCLUDE:

20% discounts on:

- professional development delivered by MAV Education Consultants
- registration for MAV's annual conference
- all books and resources in MAV's online shop.

Plus:

- MAV's quarterly member magazine, *Common Denominator*, plus the primary journal *Prime Number*, and/or the secondary journal, *Vinculum*
- membership of the Australian Association of Mathematics Teachers (AAMT)
- access to online planning tools and resources
- opportunity for institutional members to be accredited as a Mathematics Active School.
- member only offers
- priority booking at events

Taking an individual membership means that you will never miss out on seeing MAV's journals and magazines, with access to your very own copies. More importantly you can promote active engagement with your professional body as part of your CV. The membership fee is tax deductible, making it a very cheap investment to support your career development and professional reputation!

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

HOW I CAN I GET INVOLVED?

MAV depends up 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, and collaborate with other members
- writing for MAV journals
- joining committees and working parties
- producing resources
- piloting mathematics initiatives
- developing a PD event at your school or venue
- judging MTQ awards, or
- organising a maths games day for your region.

Your pathways with anzuk.education

Local Casual Relief Teaching
Whether you're partway through your degree, recently graduated or an experienced teacher; anzuk can partner with you. We have opportunities for casual and contract work in both teaching and assistant/education support roles. Our network covers greater Melbourne and includes; Primary, Secondary and Special Educational Settings within Government, Catholic and Independent Schools.

Permanent Teaching Opportunities
Our permanent team look to place educators in subject area specialists, year level coordinators, heads of department all the way up to Principals. We look for enthusiastic, confident teachers who strive to create exceptional experiences in education.

Early Childhood
Our specialist early childhood consultants are here to assist you to find both permanent and temporary work. We have opportunities for Early Childhood Teachers, Diploma and Certificate 3 qualified educators within Kindergarten/Preschools, Long Day Care and Occasional Care services all over Victoria and NSW.

Teach Interstate
As well as offices in Victoria and London, we have offices in Perth, Brisbane and Sydney offering a range of casual and permanent opportunities. anzuk work with schools across each state and also in rural and remote areas so please let us know if teaching around Australia is something you are interested in and we can put you in touch!

Teach in England
As an Australian trained teacher you are highly sought after overseas. There are many teaching options available to you whether it be full time CRT or your own classroom. We run fortnightly info sessions in our Melbourne office or via webinar. All sessions are run by our UK teaching experts who share their story with you. This is a great way to accelerate your career and travel the world.

Professional Development
anzuk offers ongoing PD sessions to equip you with the skills to be more effective at work, grow and develop your career. All our PD sessions and facilitators are fully accredited with feedback sought from attendees to ensure effective delivery is maintained. Keep an eye out on our Events Calendar on our website.

Get in touch with us today

Visit www.anzuk.education or call 03 9429 2444

anzuk.education

PRESENTER LISTING

PRESENTER LISTING A-Z

Stephanie Grenfell: B24, J5

Susie Groves: J16

VJ Gunawardana: C37, E38

Lewis Gunn: B26, J25

Leonie Haggett: G1

Jennifer Hall: G37, I20

Victoria Hall: B-C7, G-H6

Stephen Hanlon: E3, H3

Helen Haralambous: D17, E22, H39, J9

Simone Hargrave: C28, E29

Anthony Harradine: D14, H20, J14

Tamara Heaney: H34, I25, J21

John Hein: B6, G7

Lindsay Hill: B29

Brendan Hodge: H24

Neil Holden: G-H1

Kelly Hollis: G6, I3

Jan Honnens: G-H4, I-J2

Marj Horne: J13

Patricia Hosking: E36

Steve Hu: C19, J28

Bryn Humberstone: B38

Rose Humberstone: C36

Derek Hurrell: C42

Thao Huynh: C21, G27

Chris Ireson: B27, E10, G35, I10

Robyn Jorgensen: A2, B41

Jennifer Kain: G2

Anna Kapnoullas: C8, D9

Vicky Kennard: B32, C9, G14, H29

Tierney Kennedy: C34, E32, H35, I24

Nazim Khan: B-C2, D-E2, G-H8, I-J3

Pauline Kohlhoff: D40, I27

Richard Korbosky: B21, D2, G4

Adam Kruger: C26, E1

Kate Lachmund: J12

Melissa Lake: G34

Stacey Lamb: G12, I32

Dean Lamson: C1

Brian Lannen: E21

Kevin Larkin: E37

John Lawton: B21, D24

Antje Leigh-Lancaster: B33, H30

Christine Lenghaus: C30, J30

Roxanne Levett: D19, E14

George Lilley: E2, J31

Sharyn Livy: D3, E17, G28

Eadaoin Lorigan: H36

Andrew Lorimer-Derham: C43, G33

Oliver Lovell: E39, I14

Jim Lowe: G30

Troy Lowe: C4, H2

Tom Lowrie: F3

Cassandra Lowry: C14, J24

Julian Lumb: D31, I23

Alastair Lupton: D7, H7

Mandi Mackey: E40

Laura Maclean: B7, I4

Jan Mann: G21, H19

Richard Marks: H33

Ryan Martini: C29, J29

Andrew McAlindon: E16

Russell McCartney: D15

Lynne McClure: A3, B19, G22

Jenny McDonell: H38

Linda McIver: E35

Sara McKee: G34

Kevin McMenamin: C40, D38, I29, J1

Karen McMullen: C10, H15

Allason McNamara: B1, C1

Geoffrey Menon: E18, I15

Bernadette Mercieca: I17

Jared Meredith: E26

Janis Mesiti: E6, J22

Sanjeev Meston: B-C1, D5

Jodie Miller: E37

Alex Mills: C21, G27

Terence Mills: B5, G5

Michael Minas: E19, J19

Michael Minas: G37, I20

Robert Money: E11, I12

Thomas Moore: C24, D35, G40

Anthony Morphett: H17, J7

James Mott: C20, D23

Frank Moya: B-C10

Tracey Muir: F4, G8

Bill Murray: B14, E7

PRESENTER LISTING A-Z (cont.)

Deb Murrell: H18, I9

Andrew Musgrave: I25

Christian Neeson: C36

Michael Nelson: C5, H5

Damian Nicholson: I1

Andrew Noordhoff: E26

Karim Noura: B4, J26

Daisy O'Bryan: E15

Michael O'Connor: B22, G26

Connie Ompok: G10, H8

Michael O'Reilly: B28, D28, I19

Mark Oudshoorn: D25, H22

Michael Ozbun: B6, G7

Jennifer Palisse: E30, H17, J7

Mary Papp: B1

Ursula Parker: E18, I15

Anne Parnell: C4, H2

Jodie Parsons: B25, H23

Sabine Partington D4, H4

Ashley Peacock: B29

Cath Pearn: G19, I16

Ray Peck: B31

Shelley Pendlebury: D12

Thi Pham: B26, J25

Jacob Pini: H33

Meg Pini: G31, I18

Rachel Pollitt: B-C4

James Poon: D4, H4

Anne Prescott: D40, I27

Rob Proffitt-White: A4

Celeste Pryke: C3, J6

Lee-Anne Pyke: I8

Geetha Rangarajan: D39, I28

Yvonne Reilly: B25, H23

Mike Ristovsky: B10

Jim Rizos: B-C9, D-E3

Angela Rogers: B39

Pauline Rogers: B30, H28

Robert Rook: B-C6, G-H5

Raymond Rozen: B18, E13, G17

Vanessa Rule: D31, B33, H30, I23

Scott Rumble: C26

Norrian Rundle: B28, D28, I19

James Russo: A5, G1

Toby Russo: G15

Carly Sawatzki: B9

Dietmar Schaffner: E23, G32

Maria Schaffner: G32

Natalie Schilov: D19, E14

Angela Scuderi: B-C7, G-H6

Katherine Seaton: D22, H21

Jade Seddon: B40, J15

Linda Shardlow: D21

Greg Sheridan: D30, H27

Dianne Siemon: C13, E43

Pumadevi Sivasubramaniam: B3, D26

Fiona Skelton: C27

Matt Skoss: F5, H32

Carolyn Smales: B34, J27

Leah Smith : B15

Daniel Smorgon: E44, J20

Melissa Sokol: E9

Amy Somers: G1

Jim Spithill: C27

Andrew Spitty: D29, H26

Kaye Stacey: J11

Paul Staniscia: B2

Megan Steel: E34

Max Stephens: B17, C17, G19, I16

Brett Stephenson: H16

Rebecca Stewart: C35

Peter Sullivan: B13, G36,

Jenny Sutton: D37, I26

Paul Swan: D1

Philip Swedosh: C1

Duncan Symons: B17, C17

Chris Terlich: D15, H24

Margaret Thomas: C39, H40

Stacy Thomas: D34

Tony Vallance: D35, G40

Marcel Van Otterdyk: E2, J31

Tanya Vaughan: E39

Rob Vermay: H11, I7

Nadia Walker: B-C8, G-H7

Hayden Wardrop: B15

Charlie Watson: D8, E5, H9

Wendy Watts: B18, G18

Lindsay Wehrwein: B-C5, G-H3

John West: C6, I5

Leah Whiffin: B36, C32

Esther White: E28, H31

Katie White: B38

Wanty Widjaja: D33

John Widmer: E11, I12

Craig Wiese: E6, J22

Doug Williams: B12, C41, D41, E41, G16, H41, I6, J4

Gaye Williams: G33

Ray Williams: B18, G18

Rod Williams: H18, I9

Rosalind Willsher: D27, J23

Ian Willson: D43, I30, J3

Ian Wong: D36

Thomas Wong: E30

Eddie Woo : F6, G11

Neale Woods: H1, I2

Joseph Wright: C15, I11

Nicola Yelland: A6

Alexander Young: B8, G9

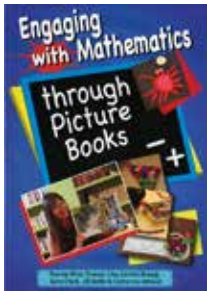
Cassandra Zara: D12

Marina Zhang: B-C7, G-H6

MAVSHOP

HTTP://SHOP.MAV.VIC.EDU.AU

MAV MEMBERS RECEIVE A 20% DISCOUNT ON ALL STOCK

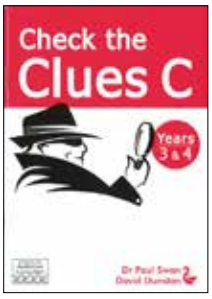


ENGAGING WITH MATHEMATICS THROUGH PICTURE BOOKS

K–2

This book will help teachers engage children with mathematics through rich mathematical and literacy experiences. It can be used as a form of professional learning and a springboard to developing your own exciting literature-based mathematics lesson.

$46.83 (MEMBER)
$58.54 (NON MEMBER)



CHECK THE CLUES C

2–7

The *Check the Clues C* by Dr Paul Swan and David Dunstan offers schools a whole school approach to word problem solving using a co-operative group approach. It's designed to improve students' comprehension of mathematics word problems, and to build mathematical understanding through problem solving and reasoning. The *Check the Clues* series uses Polya's four step problem solving approach: understand the problem, devise a plan, carry out the plan and look back. Teachers are provided with AC links, language (vocabulary), notes, answers and references.

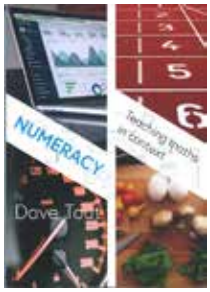
$21.45(MEMBER)
$26.81 (NON MEMBER)

SCHOOL FRIENDLY PLAYING CARDS

K–6

School friendly cards are just playing cards but without any of the links to gambling and come in a set of 2 packets. There are no picture cards - Just numbers 0 to 13. There are no suits, just shapes configured in standard subitising patterns and four different colours. You can play all of the traditional cards games like snap, fish and more using these simple, easy to use cards.

$5.72(MEMBER)
$7.15 (NON MEMBER)



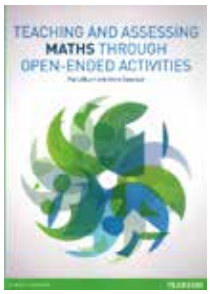
NUMERACY: TEACHING MATHS IN CONTEXT

VCAL

Numeracy: teaching maths in context describes an approach to teaching mathematics based on applied and contextual learning principles. This means that the teaching and learning of mathematics proceeds from a contextual, task-based and investigative point of view — where the mathematics involved is developed from a modelled situation or practical task. Practical investigations and projects are key vehicles for student learning in such an approach.

The approach will be helpful for teachers of students who need a practical rather than formal mathematical background for their everyday life skills and further education, training or work aspirations. The text illustrates how this approach works through contexts such as cars and driving, sport, cooking and catering, and draws together maths from the areas of number, measurement, space, data and statistics, and algebra.

$23.17 (MEMBER)
$28.96 (NON MEMBER)



TEACHING AND ASSESSING MATHS THROUGH OPEN ENDED ACTIVITIES

F–6

This book contains activities and real student work samples as a guide, to help improve student learning. It relates mathematical strategies to real life situations for students and caters for different needs, allowing for differentiated learning. *Teaching and Assessing Maths Through Open-Ended Activities* is a valuable solution for teachers to help students practise investigation, conduct assessment and create reports.

$53 (MEMBER)
$66.25 (NON MEMBER)

THE MATHEMATICAL ASSOCIATION OF VICTORIA

TO ORDER
HTTP://SHOP.MAV.VIC.EDU.AU
OR CALL +61 3 9380 2399

Prices are subject to change.