THE MATHEMATICAL ASSOCIATION OF VICTORIA

THE COMMON DENOMINATOR 1/16

LEARNING NEIGHBOURHOODS

Creating bug catchers assisted in investigative problem solving around subtraction.

INSIDE

Teachers at Broadmeadows Valley Primary School have embarked on a collaborative professional learning journey, designed to deepen their understanding on developing and using rich learning tasks to support students to 'work and think like mathematicians.'

Our teachers engage in the Timperley Inquiry Cycle of Evidence Based Professional Learning. It was through this cycle, the staff and leadership team were able to identify this professional learning need in mathematics pedagogy. Research showed that current practice needed to change in order to provide more enhanced opportunities for students to develop the essential problem solving and reasoning skills involved with such inquiry tasks, and therefore nurture the skills of a mathematician.

With professional support from Doug Williams, co-founder of Mathematics Centre and Maths300, the teams engaged in a two-session workshop style professional learning experience. The goals were to build knowledge and understanding of what rich learning tasks

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THE COMMON DENOMINATOR
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FROM THE PRESIDENT

Jim Spithill - ACER

Since 2012 the MAV has been seeking to extend the reach of its Maths Active Schools program (MAS). I was privileged in October last year to visit the latest two schools that have achieved MAS status by advancing their maths programs in accordance with the criteria. At Berwick Fields Primary School the lunchtime playground was a hive of activity with 1100 students humming around. A glimpse at some of their maths activities at a dedicated webpage is stimulating to read. At Fintona in Balwyn they adopted a focus on STEM across the year levels with exciting results.

To briefly unpack the MAS model:

MATHS: The modern world runs on many factors, such as respect, co-operation and perseverance, but in a truly fundamental sense it runs on mathematics. The surge of investment in programs around STEM is in large part because Australia risks falling short in its need for quantitative skills in decades to come, unless it urgently develops the next generation of students: the people who sit before you in the classrooms of 2016. The S, T and E of STEM are all underpinned by the M.

ACTIVE: The evidence is in that a great way for students to learn mathematics is for them to *do* mathematics. The Maths Talent Quest Awards Day at La Trobe University in October captured much of the excitement and sense of satisfaction that students felt from having original ideas and following them through to a conclusion.

The recent announcement of $6.4m from Canberra over the period up to June 2018 for the Mathematics By Inquiry project has the potential to fuel the active learning model across years F–10, by combining the resources of the Australian Academy of Science and the Australian Association of Mathematics Teachers.

A major emphasis will be on professional development for teachers, including via the AAMT Dimensions Portal, which is close to going 'live' as a source of top quality PD materials more generally. All MAV members are automatically AAMT members.

SCHOOLS: For a school community to commit to becoming a MAS requires buy-in by all concerned. The leadership group needs to provide resources, including the one that teachers are always short of: time. The teachers can use the MAS process as a focus, secure in the knowledge that all the criteria are based on research evidence about what works. The students will generally take up the opportunities on offer, surprising us with their ingenuity, and the parents will be pleased to see a focus on the jobs of their children's future.

We all start the year on a mission to improve our own and our school's performance. It goes with being a teacher that our successes motivate us to explore new ways and extend our skills. A great way to give a sharp focus to these aims is to become a Maths Active School.

References

www.mav.vic.edu.au/about-us/maths-active-schools.html or contact Ellen Corovic on 9380 2399 or ecorovic@mav.vic.edu.au.

http://bfpsmaths.global2.vic.edu.au/

www.mav.vic.edu.au/case-studies/fintona.html

www.science.org.au/mathematics-inquiry

GIPPSLAND CONFERENCE F-12
Mark 18 April 2016 in your diary right now.

The MAV is coming to you along with quality presenters such as Dr Paul Swan.

MAV MEMBERSHIP

It's really important to remember to renew your MAV membership.

Please take a moment now to call us on 9380 2399 or jump online and renew at www.mav.vic.edu.au.

VCEPD 2016

WHOLE DAY VCE WORKSHOPS

In 2016, in addition to individual SAC and MTA workshops, the MAV is offering a VCE Mathematics Day Out which includes both Meet the Assessors **and** SAC workshops in **all** three studies Further, Methods and Specialist Mathematics. All workshop participants will receive as part of their registration a USB with 2016 MAV SACs in all three studies. The day also includes morning tea and lunch.
COST: $282 (members), $375 (non-members)

WHERE	WHEN
Melbourne University	Friday 19 February, 9am – 3.30pm
Federation University, Gippsland	Monday 22 February, 9am – 3.30pm
La Trobe University, Bendigo	Friday 4 March, 9am – 3.30pm

If a whole day workshop doesn't suit, you are welcome to attend our individual SAC and Meet the Assessors workshops.

SACS

Revised study design being implemented in 2016 sees changes to the School Assessed Coursework. SAC workshops provide opportunities for teachers of VCE to be presented with and discuss possible starting points for SACs for their students. Participants will be provided with a selection of Application and Modelling and Problem Solving Tasks and will be provided with a USB of the SAC starting points in **all** studies. The process of developing appropriate tasks, including criteria mapping and the inclusion of technology is discussed with specific reference to the sample tasks provided at the session.
COST: $160 (members), $200 (non-members)

WHERE	WHEN	WHICH STUDIES
SW region (Ballarat)	Date TBC, 5pm – 7.30pm (check website for confirmed date).	All
NE region (Burwood)	Wednesday 9 March, 5pm – 7.30pm	Maths Methods
NE region (Burwood)	Thursday 10 March, 5pm – 7.30pm	Further Maths and Specialist Maths

MEET THE ASSESSORS

Assessors will discuss the processes for setting and marking the 2015 examinations. The presenters will provide a full analysis of the 2015 examinations highlighting student responses and key misunderstandings. Assessors will comment on questions that are no longer assessable in the Revised 2016 Study Design. There will be time for questions and discussion. Please bring a copy of the relevant VCAA 2015 exam with you.
COST: $74 (members), $93 (non-members)

WHERE	WHEN	WHICH STUDIES
Geelong	Tuesday 15 March, 5pm – 7pm	All
Horsham	Wednesday 16 March, 5pm – 7.15pm	All (except Specialist Exam 2)
Williamstown	Monday 21 March, 5pm – 7pm	All
Burwood	Tuesday 12 April, 5pm – 7pm	Further Maths and Specialist Maths
Burwood	Wednesday 13 April, 5pm – 7pm	Maths Methods
Wangaratta	Wednesday 20 April, 5pm – 7.15pm	All (except Specialist Exam 2)

Dates are subject to change. Check www.mavvic.edu.au for the most up-to-date schedule.

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LEARNING NEIGHBOURHOODS

Krystina Simpson – Assessment and reporting coordinator and mathematics specialist, Broadmeadows Valley Primary School

Learning Neighbourhood Three focus on multiplicative strategies.

look like in practice and the underlying theory behind teaching in this way. The design and implementation of rich, open ended learning experiences which allow students to explore, apply and extend the explicit teaching and learning, and the building of teacher capacity to guide investigation through effective learning conversations were a focus. We wanted to enable students to develop their understandings thus building a repertoire of strategies and tools they could apply to various problem solving situations. Working collaboratively in this way, students develop and articulate extensive language and thinking around mathematics and problem solving, which becomes consistent across the school.

In a short time, the impact of this professional learning experience is already becoming evident in each learning space at BVPS.

Our Learning Neighbourhood One students have been creating 'bug catchers' which have assisted in investigative problem solving around subtraction.

In Learning Neighbourhood Two, students have been implementing some threaded fluency activities exploring counting, place value and calculator skills (see image on page 5).

Learning Neighbourhood Three students have also trialled threaded fluency tasks with a focus on multiplicative strategies and the importance of articulating their thinking (image above).

The feedback from the staff following Doug's discussion lessons and participation in professional learning and curriculum design sessions with each team was overwhelmingly positive. Through focussed observations, teachers identified the lessons:

- Created a non-threatening and engaging learning environment
- Provided opportunities for predicting/estimating and encouraged students to take risks
- Were contextual and captured interest and ignited curiosity
- Provided opportunities for peer coaching/support
- Allowed for students to lead the learning and the direction was open-ended
- Built skills and confidence in students articulating their learning
- Utilised materials to assist in the learning.

Through the ongoing professional dialogue within professional learning teams, each Learning Neighbourhood team continues to engage in their professional learning cycle using the Timperley model, including engaging in further professional reading and inquiry, transferring theory into practice and measuring the impact of their instruction. Broadmeadows Valley Primary School's teachers are continuing to build on their exceptional practice to develop a consistent, school wide approach to mathematics and create rich learning experiences which challenge, enrich and inspire students to work and think like mathematicians.

Learning Neighbourhood Two explore counting, place value and calculator skills.

THE JMSS WAY

Luke Bohni - Head of Mathematics and Professional Learning Coordinator, John Monash Science School

The John Monash Science School is Victoria's first specialist school for sciences, mathematics and associated technologies. The school opened in 2010 on the Monash University campus in Clayton and since opening, has achieved some fantastic milestones, one of which includes, being recognised as a MAV Maths Active School.

Mathematics plays a very important part of life at JMSS. From the beginning, Monash University Academic (and Mathemagician) Burkard Polster played a pivotal role in the development of a modern mathematical curriculum.

The majority of our Year 10 students study Core Mathematics, a subject based around a traditional Year 10 mathematics course but with a few twists. Students begin the year by investigation problem solving and inductive and deductive reasoning and then throughout the year are encouraged to explore and investigate the topics of study. A project that gets students to answer the question 'How could I use mathematics to change the world' always results in some fascinating ideas and innovations.

A unique elective subject, called Logic to Magic, is also offered to Year 10 students as an additional subject in their curriculum. In this subject, students explore and play with the mathematical ideas and concepts which are responsible for making famous mathematicians, well, famous. Burkard will regularly come and co-teach this subject with their maths teacher and students will explore everything from card shuffling and mental arithmetic to fractals, origami and homeomorphically irreducible trees of degree 10.

The end of semester examination of this subject is always entertaining to watch as students shuffle decks of cards and build origami shapes within the examination itself.

The final question on the exam is also to identify the pattern that the multiple choice answers follow (in the past this has included the fibonacci sequence and the first digits

of Pi). This subject is also taught through JMSS' virtual science school, Emerging Sciences Victoria, which enables Year 10 students from across Victoria to attend and interact in real-time virtual classes twice a week and learn the unique content from two of our mathematics teachers.

IMMERSION DAY

JMSS also takes a day out of its regular program each year to run a Maths Immersion Day for all Year 10 and 11 students. During this day, students are put into small teams that move around the school to solve maths puzzles and problems.

The day is modelled after the movie Fermat's Room and so students are solving problems in an attempt to avoid being squished and the tag-line for the day is *Do the Maths, Stay Alive*. The day culminates in a lecture from Burkard Polster who goes over the answers to all the puzzles that students encountered during the day.

Mathematics is one of the largest subject areas at JMSS. On average, we have nine Maths Methods classes running in Year 11 and in Year 12 annually. Of our Year 12 cohort, roughly one third will complete Specialist Maths and the school also offers the computer science subject, Algorithmics (HESS) where students investigate algorithm design patterns and techniques to model and solve problems.

In Year 11 we also offer a super-subject called Computational Physics that combines the study of Specialist Maths 1&2 with Physics 1&2. Students studying this subject have six lessons each week (as opposed to the usual three) and make use of computational engines such as Mathematica and Matlab to model and solve physics and maths problems. Students who complete this course get credit for having completed Specialist Maths 1&2 and and Physics 1&2.

While JMSS is a selective school, we select students based on their passion and interest in science and so we can end up with quite a wide variety of mathematical abilities in our maths classes.

THE JMSS WAY

Our classes are team taught with, typically, two teachers and 50 students in each class. This provides us with the opportunity to differentiate learning for individuals and groups within each class more effectively as well as experiment with different types of activities and learning sequences.

The culture of the school is built around the *JMSS way* which is really about always doing your best and learning from your experiences.

Due to the nature of the school and the students who come here, mathematics assessment tasks can be quite difficult at JMSS in order to ensure that we provide high achieving students with the opportunity to demonstrate their level of understanding. As a result, incoming students have to learn quickly that it is OK to struggle sometimes and that the important thing is to learn from mistakes and to continually strive towards improvement.

We provide students with a skills based feedback on assessment tasks rather than the traditional percentage of correct answers. This skills based feedback provides students with an idea about how they are progressing against a benchmark set by the school in identified skill areas rather than topic areas.

This allows students to be able to focus on improving their skill from topic to topic rather than treating each topic as its own, isolated silo of learning and avoiding statements such as 'I like trigonometry but am terrible at algebra'.

A MATHEMATICS ACTIVE SCHOOL

Being a MAV Maths Active School is a way of recognising that a lot of the things that we have become accustomed to doing here at the school is actually quite special.

It also is a constant reminder for our school community that mathematics is an important part of life at JMSS. We really do pride ourselves on our approaches to teaching mathematics at JMSS and are

committed to sharing our experiences and knowledge with other schools and teachers.

We regularly have visits from schools and universities who are interested in our model of teaching and learning and since opening in 2010, JMSS has always ensured that it has presenters at the MAV Annual Conference to present on topics such as using data in mathematics to inform teaching and learning, the Year 10 maths course at JMSS, SOLO Taxonomy, possible extensions of topics and concepts relating to the Specialist Maths and Maths Methods courses, use of scratch and block based coding programs in mathematics, and a new skills-based feedback model being introduced at JMSS.

If you want to learn more or organise a school visit, please feel free to contact me at luke.bohni@jmss.vic.edu.au.

Maths Active School accreditation is a great way to showcase your schools' effective mathematics teaching and learning programs. To be accredited, schools must complete an application that will be reviewed by the MAV's team of mathematical education consultants and the MAV Council.

For further information go to www.mav.vic.edu.au/about-us/maths-active-schools.html or contact Ellen Corovic ecorovic@mav.vic.edu.au or 03 9380 2399.

THE MATHEMATICAL ASSOCIATION OF VICTORIA

MATHS ACTIVE ACCREDITATION

GET ORGANISED FOR 2016

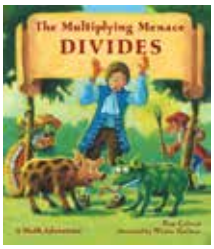
MAV MEMBERS RECEIVE A 20% DISCOUNT ON ALL STOCK

SIR CUMFERENCE AND THE FIRST ROUND TABLE

4–7

King Arthur was a good ruler, but in this maths adventure he needs a good ruler. Geometry is explained with humour in *Sir Cumference And The First Round Table*, making it fun and accessible for beginners. What would you do if the neighbouring kingdom was threatening war? Naturally, you'd call your strongest and bravest knights together to come up with a solution. But when your conference table causes more problems than the threat of your enemy, you need expert help. Enter Sir Cumference, his wife Lady Di of Ameter, and their son Radius. With the help of the carpenter, Geo of Metry, this sharp-minded team designs the perfect table conducive to discussing the perfect peace plan. Thanks to Sir Cumference, even the most hesitant will be romancing maths.

$13.81 (MEMBER)
$17.26 (NON MEMBER)

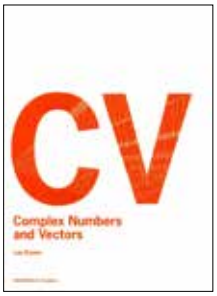


THE MULTIPLYING MENACE DIVIDES

3–6

A 'ribbiting' maths adventure! After being banished to the Abyss of Zero in *Multiplying Menace: The Revenge Of Rumpelstiltskin,* Rumpelstiltskin is back, and he's stirring up more trouble than ever. Together with his sidekick, a witch named Matilda, Rumpelstiltskin plots his revenge on Peter and uses his magical powers to divide the kingdom into frogs. Peter and his dog, Zero, must locate the Great Multiplier and find a solution that will break the Great Divide before Rumpelstiltskin has a chance to combine the two mighty math sticks. Can Peter save the kingdom in time, or will it meet a green and warty fate?
Young readers will fall in love with this maths adventure and learn all about dividing by whole numbers and fractions, as well as division rules for equations involving zero.

$15.33 (MEMBER)
$19.61 (NON MEMBER)

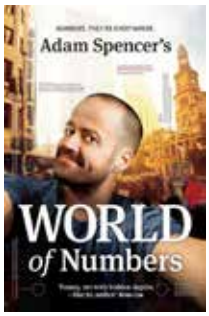


MATHS WORKS FOR TEACHERS: COMPLEX NUMBERS AND VECTORS

11–12

To have the courage to think outside the square, we need to be intrigued by a problem. This book draws on the power of intrigue and uses appealing applications from navigation, global positioning systems, earthquakes, circus acts and stories from mathematical history to explain the mathematics of vectors and discoveries in complex numbers.

$36.35 (MEMBER)
$45.44 (NON MEMBER)



ADAM SPENCER'S WORLD OF NUMBERS

ALL

A funny and enlightening romp through the world of numbers with one of Australia's best-loved broadcasters. By popular demand, Australia's funniest and most famous mathematician is back with a brilliant new book. *Adam Spencer's World of Numbers* takes the reader on a fun-filled ride, explaining the crucial role numbers play in our understanding of sport and space, computers and cooking, and a whole lot in between.
With his trademark wit, Adam decodes barcodes, explains why we say 'as sixes and sevens' when we're discombobulated - and works out if there really a word in the English language with 189,819 letters! This is a book for readers of all ages who love numbers, or just love to laugh and learn about the wonderful world we live in.

$34.29 (MEMBER)
$42.86 (NON MEMBER)

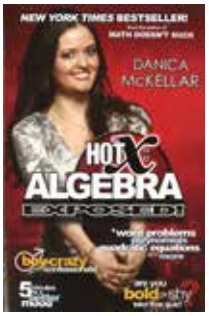
GEOSHAPES MIXED CLASS PACK

F–10

Popular for building spatial perception, create tessellations in 2D and polyhedra in 3D. The pack is accompanied by a CD of worksheets, with answers, written by Ian Lowe, suitable for middle years. One tub of linkable regular polygons includes 144 triangles, 72 squares, 36 pentagons and 12 hexagons, octagons and decagons. They are also used in several Maths300 lessons and problems in the Mathematics Task Centre.

$220 (MEMBER)
$275 (NON MEMBER)

THE MATHEMATICAL ASSOCIATION OF VICTORIA



HOT X: ALGEBRA EXPOSED

7–9

McKellar's third book tackles the most feared of all maths classes: algebra! Algebra: The word alone has been known to strike fear in the hearts of even the best students, but help is here! This book shows students how to master algebra topics like square roots, polynomials, quadratic equations, word problems, and more.

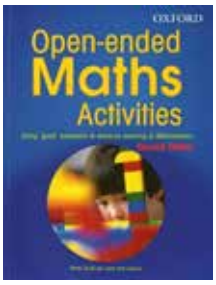
$36.40 (MEMBER)
$45.50 (NON MEMBER)

MATHS HANDBOOK FOR TEACHERS AND PARENTS

3–9+

This book is intended to be a mathematics resource for both teachers and parents. It includes an overview of the early childhood years, but covers the detailed content ranging from around mid Year 3 to Year 9 and beyond. The book covers all the content in the Australian Mathematics Curriculum. However, no matter what maths curriculum is followed in your school, the content of this book will still apply. Each strand and topic is developed sequentially without reference to year levels, so it is merely a matter of locating the material appropriate for the particular stage of learning being considered.

$20.74 (MEMBER)
$25.92 (NON MEMBER)



OPEN-ENDED MATHS ACTIVITIES: USING GOOD QUESTIONS TO ENHANCE LEARNING IN MATHEMATICS

F–8

Open-ended Maths Activities discusses a type of open-ended, problem-solving question called a 'good' question. These questions enhance learning, teaching and assessment and are a useful addition to a teacher's list of teaching strategies.

$67.62 (MEMBER)
$84.53 (NON MEMBER)

WHAT'S YOUR ANGLE PYTHAGORAS

5–9

Young Pythagoras can't seem to stay out of trouble. Every time he tries to help, people get angry. What's a curious kid to do? On a trip to Egypt, Pythagoras' curiosity helps him discover the secret of the right triangle. A clever introduction to the Pythagorean Theorem.

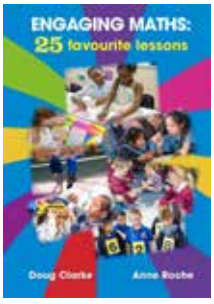
$15.35 (MEMBER)
$19.19 (NON MEMBER)

ALICE IN WONDERLAND

6–8

This edition contains *Alice's Adventures in Wonderland* and its sequel *Through the Looking Glass*. It is illustrated throughout by Sir John Tenniel, whose drawings for the books add so much to the enjoyment of them. Tweedledum and Tweedledee, the Mad Hatter, the Cheshire Cat, the Red Queen and the White Rabbit all make their appearances, and are now familiar figures in writing, conversation and idiom.

$6.32 (MEMBER)
$7.90 (NON MEMBER)



ENGAGING MATHS: 25 FAVOURITE LESSONS

F–6

This book aims to enrich the mathematical experiences of primary school students (and their teachers) through enjoyable, challenging and active lessons. Why not explore grid coordinates and compass directions through a piratical 'Treasure Island' map, or introduce simulation through a 'Throwing the globe' activity, or play a few rounds of 'Color in decimats'?
Each lesson follows a similar pattern, beginning with an engaging hook. There are clear instructions, interesting professional musings (including highlighting common misconceptions) and ideas for pulling the lesson together at the end. The lessons are complete, with reproducible activity sheets and further professional references. Reflections from the authors highlight some of the key pedagogical aspects and assessment potential.

$50.05 (MEMBER)
$62.56 (NON MEMBER)

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FEARLESS
TACKLING MATHS ANXIETY HEAD ON

Tina Fitzpatrick and Dona Martin - La Trobe University

REFLECTIONS ON A STUDENT'S FIRST CONFERENCE PRESENTATION

After months of weekly meetings, hundreds of emails and many practice sessions, a group of very excited third year students and their teacher from La Trobe University Bendigo arrived at the Bundoora Campus for their first MAV conference presentation.

The pre-service teachers describe, bursting with pride, wearing lanyards that read 'speaker', mingling and networking with other passionate educators; and coming away with not only great resources and teaching ideas but also with quite a 'bite' from the MAV bug - already thinking about the 2016 conference.

Why is all this so surprising? Until recently, most of these pre-service teachers would never have expected to be speaking at a maths conference - let alone having become passionate advocates for mathematics.

During their time at La Trobe they have experienced a paradigm shift in the way they think about, learn and teach mathematics.

Our students undertake a compulsory third year mathematics subject which focuses on understanding maths at a conceptual level and their learning is enhanced with explorations of mindsets toward learning. We take students through this journey of changing fixed mindsets into growth mindsets. Due to their growing enthusiasm, students volunteered to be part of a project in the following semester, in which they would team teach the first year students with their lecturer, Tina.

There have been many benefits for all involved in this journey of becoming great maths teachers. We were able to show the first year students how maths, when taught well, can be fun, creative and even beautiful.

We put into practise our beliefs around growth mindset (based on the work of Jo Boaler), and we offer the following three examples of newly established classroom norms:

- Everyone can learn maths to higher levels (encouraging students to stop saying 'I'm just not a maths person' and similar fixed mindset statements)
- Taking your time to learn something deeply is more important than being fast at maths (many mistakenly thought that because they were slower at answering, they were not 'good at maths')
- Mistakes are valuable learning opportunities – having to fix mistakes, this 'struggle', assists brain growth

Positive reinforcements like these were commonplace and they encouraged everyone involved to feel they could achieve. At the end of our team teaching project, the third year students were enthusiastic about writing an article for the MAV proceedings and then delivering their passionate message at the conference. The first year students are looking forward to similar opportunities in the future.

The hard work and preparation we put into this year's conference certainly paid off.

- The students gained an incredible experience in the art of public speaking
- They became 'experts' in using growth mindset theory to help reduce maths anxiety thereby improving the state of learning and teaching mathematics
- They realised that they really did have something great to offer the wider community,

> *'A program like this will continue to spread and grow due to its quality. What you guys are doing is brilliant and so important in developing young minds, not only in mathematics but in general. If all teaching can be conceptually based and create real meaning for students then you create critical thinkers and problem solvers. Clearly the mentoring program works because of the passion of the people involved'.*
> - Michael Ritchie, audience member.

Many of the students had come to university having had negative experiences of maths in their past. The team teaching/ mentoring program and subsequent experience of writing with their lecturer and presenting at a conference, have given them an incredible opportunity to broaden their knowledge, confidence and experience of mathematics teaching.

It has given them the power to not only tackle maths anxiety in themselves, but the ability to help others deal with this difficult problem. The students now strive for more maths experiences.

In fact, two students are taking their passion to the next level this year and researching maths mindset further as part of their 2016 honours study.

Thank you MAV for providing this opportunity.

If you've ever considered presenting at the MAV conference, make 2016 your year!

The call for abstracts and important dates will be on the MAV website in the coming months, www.mav.vic.edu.au

RENEW NOW

02 INNOVATION

MAV's Made by Maths app is real world mathematics delivered in a teacher and student friendly smartphone app. It's an excellent resource for mathematical excursions. Aimed at Australian Curriculum levels 7-10.
madebymaths.mav.vic.edu.au

03 STUDENT ENGAGEMENT

MAV run the National Mathematics Talent Quest each year as well as the very popular student revision lectures.
www.mav.vic.edu.au

01 RESOURCES

Members get 20% off all resources in the MAV's online shop. The shop is stocked with useful and informative resources suitable for all year levels, including trial exam papers, mathematical story books, teaching guides and hands-on resources.
http://shop.mav.vic.edu.au

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04 DIFFERENTIATE

Differentiated unit plans, planning templates, assessment criteria and links to suitable online resources are all accessible from MAV's free member resource, Teach Maths for Understanding.
www.mav.vic.edu.au

06 ACCREDIT YOUR SCHOOL

Get your school recognised for excellence in mathematics teaching and learning. You can use MAV's formal accreditation to acknowledge the great work that is taking place at your school.
www.mav.vic.edu.au/mathsactive

05 SUPPORT

Invite the MAV to assist you and your teachers with coaching, mentoring, modelled teaching and supporting the mathematics program at your school. Flexible arrangements mean that we can assist you anytime you need us - in person or over video conference.
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MATHS AT NIGHT

Amee Walker - Year 5/6 teacher, Brunswick North Primary School




At Brunswick North Primary School we value all areas of the curriculum; we are aware of the need for balance in our delivery to produce thoughtful, considerate and holistic life-long learners. However, literacy and numeracy are two areas of the curriculum that are tightly woven into the fabric that our students are weaving.

One of the goals in our current strategic plan is to raise numeracy levels across the school. We regularly include articles in the school newsletter to raise awareness that maths is everywhere, and provide suggestions to families on how they can draw attention to it in a positive fashion, without needing to sit down formally.

Families are becoming busier, but this does not mean we want to lower the expected outcomes we set for our students. We wanted to garner support from our community without placing strain on their precious time. How could we begin to remove the obstacles that some children, and even some adults, have placed between them and their mathematical understanding?

Anyone in education can attest to the fact that the best way to increase engagement is to make something fun. Who better to put the fun in maths, than MAV? So we enlisted mathematical education consultant, Ellen Corovic to host a Family Maths Night.

MAV provided excellent resources and suggestions for a rotational series of activities running over five rooms, and our numeracy team set their sights on full community participation. We advertised the evening through our newsletter and assembly to promote excitement and enthusiasm through our teaching and support staff, and generate interest in the students, so that they would engage their parents and get them on-board.

After much planning and hype, the evenings were upon us. We needed to run three evenings due to the massive response from our community! We were very excited, the classrooms were prepared, teachers and support crew had all their resources, and everything was labelled for a smooth evening.

The success of the events were clear from the giant grins plastered on students' faces, the bent heads of parental figures solving problems with their charge(s), and the satisfied educators in attendance - a personal favourite comment of the evening was, 'Wow, *this* is maths?!'. Now I could have misheard, but I think an adult said it...

MAV have written a handy guide on how to run a Family Maths Night. It's a great electronic resource that you can use to create a fun FMN at your school. The resource is $85 (member price). There is an additional cost to hire Geoshapes and PLANKS.

If you would like MAV to run a Family Maths Night for you (we bring all the materials and resources) the cost is $520 (member price).

For further information contact Ellen Corovic ecorovic@mav.vic.edu.au or 03 9380 2399.

2016 MAV PD

During semester 1, 2016 a variety of presenters and MAV's own mathematics educational consultants will present workshops focusing on innovative teaching practice. **Make sure you reserve a place by booking online early, www.mav.vic.edu.au/pd.**

TOPIC	DATE	YEARS	PRESENTER
Improving fluency across mathematics	8/2/16	F - 6	Jen Bowden
Effective planning using online resources - Scootle	16/2/16	F - 10	Jen Bowden
Tips for hosting a Family Maths Night	17/2/16	F - 10	Ellen Corovic and Helen Haralambous
Maths 300 - secondary	23/2/16	7 - 12	Ian Lowe
Working mathematically in the early years	24/2/16	EY - 2	Doug Williams
Readdressing mathematical conceptions using LEGO	25/2/16	5 - 8	Dianne Winbanks
Picture story books in mathematics (TEAM:P)	2/3/16	F - 6	Ellen Corovic
Fractions and decimals	TBC	F - 6	Ian Lowe
Maths 300 - primary	16/3/16	F - 6	Ellen Corovic
Ideas for teaching place value	17/3/16	F - 4	Kerryn Driscoll
Games: Just trivial pursuits?	19/4/16	F - 6	Dr Paul Swan
Algebra	26/4/15	7 - 10	Ian Lowe
Working mathematically through collaboration: Clue cards and investigations	3/5/16	F - 6	Jen Bowden

TURNING 100

Louise Gray - editor, *The Common Denominator*

I remember sitting in my maths classes at high school and hearing my classmates groan, 'When would we ever need to know algebra in real life?', or 'Will I ever use circle geometry in my job?'

As a lover of maths, I wasn't the one complaining, but every now and then I did begin to wonder, when I finally became an adult and started 'real life', how often maths would show up in my job.

Now that I am an adult with a job I can see mathematics all around me. It is fundamental to so many aspects of daily life. I am a marketing manager and I use maths daily: figuring out advertising budgets, interpreting market research about different target markets, analysing statistics, trying to identify trends, adjusting pricing, and the list goes on.

I am also a mother of three young boys and I am trying to teach them that maths is all around us. Although they are still young, I believe it is important to foster a love and curiosity of mathematics. My children are eight, six and one and recently we conducted a mathematical investigation that was quite fun. I thought I'd share it here.

BIRTHDAYS

We were having a chat about birthdays and Mr Eight asked me how old I was. I told him I was 34. 'And how old is Dad?' he wondered. '35,' I responded. Mr Six thought for a little while and said, 'You plus Dad equals 69.'

'That's right,' I said. 'And what would the total be if we added all our family together.' After a moment of thinking and some finger counting Mr Six declared that the total was 84.

The children were getting right into this exercise, so I tried to extend it further. 'You are right, everyone in our family added together is 84. Can you tell me what year will it be when all our ages together equal 100?'

The children were eager to figure this out and I was interested to see how they'd go about it. Mr Eight said that our ages equalled 84 in 2016 but no-one had yet had their birthday in 2016 so he concluded that at the end of 2016 the sum would equal 89 (five more). He arrived at this answer by adding 35, 36, 9, 7 and 2. Mr Six said that the year after that (2017) our ages would equal 94. After this statement, the boys were a little stumped about where to go next. I grabbed a piece of paper and wrote down our findings in a table like this:

Year	2016	2017	2018
Total age	84	89	94

Mr Six looked at the data and said, 'There is a pattern. Every year you plus five on.' Mr 8 used that information to say 'Well, in 2018, we'll be 99'.

'Yes, that's right,' I said. 'What will happen in 2019?'. 'We'll be 104!' said Mr 6. Both children looked a little downcast. 'We'll never be 100.'

'Ah! But we will be 100 at some point. Let's think a bit more.' I started a conversation about months of the year. The boys already knew that one year contained 12 months. I reminded them that each member of our family was born in a different month and how the information in our table reflected our ages at the end of a year.

'Let's look at what happens *during* 2018.' The boys wrote down our birthday months: April, May, June and October (x2).

They figured out that although the yearly increase in our ages was 5, the increase was one-by-one, after each birthday.

It took about a minute longer for them to busily put their heads together and then announce – shout – 'We'll be 100 in April 2019!'. They went one step further, 'We'll be 100 on the ninth of April, 2019.'

As a parent, it was very interesting for me to see the different ways the children tried to tackle the problem. They did need some prompts and clues and I tried to ask open questions to gently steer them in the right direction. Both boys were very proud of themselves for working the question out and this made them curious and hungry for more tricky problems. Now I just need to figure out what the next problem could be!

This investigation showed the children that mathematics has a very practical application to the world. We explored problem solving, multiplicative thinking, arrays, data analysis and patterns. Best of all, we had fun.

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4. Fill in the contact form
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CASIO

INSPIRED BY AUSTRALIAN TEACHERS FOR AUSTRALIAN STUDENTS

MAKING CONFIDENT MATHS TEACHERS

Many schools are short of trained teachers for their junior secondary mathematics classes. Some have been teachers of senior maths classes and others usually teach other subjects. All these teachers are being asked to teach Years 7 or 8 and need help.

MAV is aware of this, as many schools ask us what can be done. In the long run we need more good maths students to become maths teachers. Let us teach so as to inspire them. But in the short run we need to persuade those who are teaching junior maths classes without training to get support.

Ian Lowe, MAV's highly experienced maths education consultant, is offering a series of workshops to make a start at solving this problem. It is a course called Making Confident Maths Teachers. It has much in common with a university 'methods' course; Ian has taught these many times. By attending all the nine workshops in this course, and completing the assigned tasks, a teacher will be able to achieve one or both of two major goals:

- become confident with both the mathematics content and some excellent ways to help students learn it;
- demonstrate that confidence by actually teaching maths classes and providing evidence of good pedagogy.

At the end MAV will provide a certificate to teachers showing what part of the course they have successfully completed.

WORKSHOP CONTENT

Each junior secondary class includes many who are still working at primary level. So each session will include material from the primary curriculum, and extend it into secondary levels.

Part 1: Understanding Number

Sat 13 February - Whole numbers
Place value, add, subtract, multiplication and division for whole numbers, decimals and percentages.

Sat 27 Feb - Decimals and fractions
Basic concepts, add, subtract, multiplication and division for decimals and fractions.

Sat 16 April - Ratio, proportion and percentages
Basic concepts of ratio and proportion, with many applications, including percentages.

Part 2: Understanding Algebra

Sat 5 June - Linear algebra
Getting started with functions and graphs through generalising arithmetic.

Sat 19 June - Expanding and factorising
Linear expanding and factorising as a generalisation of the distributive law.

Sat 16 July - Non-linear algebra
Building ideas about quadratic functions, exponential functions and index laws.

Part 3: Understanding Measurement, Geometry, Statistics, Probability

Sat 10 September - Measurement
A range of hands-on problem solving activities for length, area, capacity, volume, time and speed.

Sat 8 October - Geometry
A range of hands-on problem solving activities for 2D and 3D shapes, transformations and symmetry.

Sat 22 October - Statistics and probability
Ways of building ideas of statistics and probability that engage.

The workshops will be very hands-on, and teachers will work in groups to assist each other to both understand the maths and know how to help students to do the same.

In each workshop many learning resources will be provided. Studying these will comprise much of the homework between sessions. For this reason, continuous attendance is highly recommended.

WORKSHOP COSTS AND REGISTRATION

The workshops will be held at the MAV office in Brunswick from 10am to 4pm, with lunch supplied. It is expected that principals will cover the low cost of these sessions. Teachers may enrol for individual sessions. VIT-registration is not required for attendance.

- MAV member: $60 per session (teacher) or $40 (CRT),
- Non-member: $75 (teacher) or $50 (CRT).

This fee includes access to Maths300 lessons for 2016, for the teacher only. CRT teachers can join MAV for $67.

Registration is at www.mav.vic.edu.au/pd. Please notice that the first Saturday is very soon: 13 February. (If you miss the first session, and there is enough interest we may repeat the session. Please contact MAV to let us know: 9380 2399.)

It is best if two or more teachers came from the same school, so they may support one another in the classroom as they implement the teaching suggestions from the workshops.

DEMONSTRATING CONFIDENCE AND COMPETENCE

The second goal is the practicum part of the course. This is only available to VIT-registered teachers who can actually teach and are attending the workshops. This will be managed with the assistance of a mentor from the teacher's school who will help provide evidence (written, photos, videos) of successful teaching to MAV. There is an additional charge of $100 per teacher for this service.

RESOURCE REVIEWS

MATHS IS ALL AROUND YOU – DEVELOPING MATHEMATICAL CONCEPTS IN THE EARLY YEARS BY MARIANNE KNAUS

The book is a very useful resource for both practising early childhood practitioners as well those studying. It gives a very comprehensive and easy to follow overview on the theories, the role of the adult and teaching mathematics through play experiences. What I really liked in the first chapter, 'Teaching and learning mathematics', was addressing one's own attitude and philosophy around mathematics as this can impact how we view and teach mathematics to young children.

The book itself is user friendly with clear headings of what the mathematical concepts are, why that particular learning is important and what to teach, followed by lots of photos and ideas on how to apply those to the learning environments.

The photos and ideas give inspiration and are simple to apply, using everyday materials or with some specific mathematical resources. Highlighting the outcomes from the National Early Years Framework is also very helpful in assisting educators to assess the learning and for documentation purposes.

As the educational leader, I introduced the book to the educators who then took turns in going through the book. I was able to refer to it and use it as a talking point in supporting the pedagogy. The educators began to apply some of the experiences on offer and also reinvigorated the teaching and language they used with the children. It also made them reflect on their practice and how they are doing incidental mathematics with the children.

The book also helped to support the educators in getting the message across to families about the mathematical learning that was taking place and how this is a huge part of the children's everyday learning and forms the building blocks for later formal learning.

It was very relevant to have the chapter on ICT and maths. Technology is a component of children's learning now and whilst at our service we have very little digital learning within the program it certainly made for debate and critical thinking.

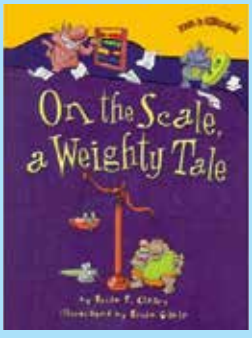
I would highly recommend this book for educators, students and educational leaders working with all age groups in early childhood settings and the early years of primary school.

Reviewed by Rose Kelly - Director and Educational Leader at Swinburne Prahran Community Children's Centre Co-op

Maths Is All Around You is available in the MAV's online shop.

$46.83 member price
$58.54 non-member price

ON THE SCALE, A WEIGHTY TALE BY BRIAN P CLEARY, ILLUSTRATED BY BRIAN GABLE.



Often a hook for starting a new topic of maths is to read a picture book to students to engage them as well as discover what they know already. *On the Scale of a Weighty Tale* is an example of one such book, introducing the concept of the measurement of mass, or more correctly weight.

Throughout the book there are comparisons of familiar objects as well as the introduction of formal measurement units. There are wacky cat illustrations (found in other books of the same series) along with humorous rhyming text.

Given this is an American text, there is reference to the Imperial measurements but it also includes the metric system with comparisons between the two, including a short note explaining both as well as a basic comparison table at the end.

This is a visually appealing book but I found it lacking for an Australian classroom. We only use the metric system, including a second system when introducing a new subject may lead to misunderstandings. We measure mass not weight, again I want my students to be clear about what they are investigating/learning so use the correct vocabulary from day 1. This did make me ask 'Mr Google' if there was a difference (and there is) and as stated by AusVELS, we teach the 'measurement of mass'.

The other difficulty I had with this book was the rhyming verse. I teach Early Years and I found that the message of comparison got a little lost in the rhyming words. It made me feel that the emphasis of the book was on rhyming rather than maths.

On the Scale of a Weighty Tale is an enjoyable, visually attractive read but not one I would use in my classroom as a means of leading into or during the investigation of the measurement of mass.

However, it may be useful at the end of teaching a mass measurement unit. Students could make connections between what they have learnt and the book. Its value may lie in being used as a reflection of learning rather than a hook at the beginning of the unit.

The book is suitable for Years 1 - 4.

Reviewed by Pat Withell, Alfredton Primary School, Ballarat

On the Scale of a Weighty Tale is available in the MAV's online shop.

$14.13 member price
$17.66 non-member price

Visit http://shop.mav.vic.edu.au.

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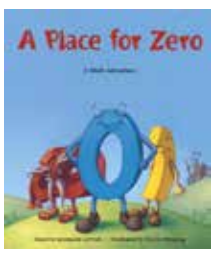
PRIMARY MATHEMATICS: CAPTIALISING ON ICT FOR TODAY OR TOMORROW

F–6

Primary Mathematics provides a comprehensive introduction to teaching and learning mathematics in today's classrooms. Drawing links to the Australian Curriculum, this book covers the core learning areas of measurement, space and geometry, early number concepts, data and statistics, chance and probability, and patterns and algebra. At the centre of this book is the belief that ICT can be a powerful tool for enhancing student learning. Although many classrooms have been resourced with computers, interactive whiteboards and mobile technology, teachers need to be able to transform these technological tools into meaningful teaching and learning experiences. This book explores the ways technology can be integrated into the mathematics classroom. It explores student diversity, assessment 'for', 'of' and 'as' learning, and teaching in rural and remote areas. This book is an indispensable resource for pre- and in-service teachers alike.

$93.33 (MEMBER)
$116.67 (NON MEMBER)

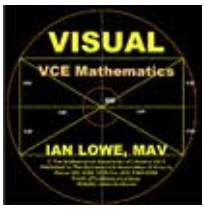


A PLACE FOR ZERO

F–3

Having nothing to bring to the game of Addemup, Zero cannot play with the rest of the players in Digitaria and so must come up with a clever plan that will let him play despite his numeric shortcomings.

$15.28 (MEMBER)
$19.09 (NON MEMBER)



INTERACTIVE LEARNING FOR VCE: VCE MATHS MADE VISUAL

VCE

The hardest part of VCE maths subjects for many students is understanding the advanced and complex ideas involved, something that textbooks rarely do well. Interactive diagrams make it visual.

One of the powers of spreadsheets is that they can create drawings that can change according to the entries made by the user. Ian has used this power to demonstrate the idea behind every topic, including matrix multiplication, complex numbers and and calculus. There is at least one spreadsheet for most topics, sometimes many.

This is a downloadable resource. There are separate PDF files and folder of spreadsheets for each VCE maths subject, except Specialist Maths 3&4.

FOUNDATION: 105 SPREADSHEETS
$36 (MEMBER)
$45 (NON MEMBER)

GENERAL: 228 SPREADSHEETS
$100 (MEMBER)
$125 (NON MEMBER)

SPECIALIST 1 & 2: 230 SPREADSHEETS
$100 (MEMBER)
$125 (NON MEMBER)

FURTHER: 199 SPREADSHEETS
$36 (MEMBER)
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MATHS METHODS 1 & 2: 104 SPREADSHEETS
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MATHS METHODS 3 & 4: 63 SPREADSHEETS
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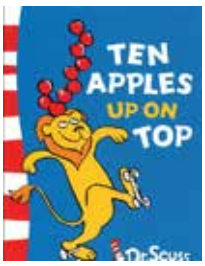
$45 (NON MEMBER)



TEN APPLES UP ON TOP

F–2

Learning to count has never been more fun than in this crazy tale of a dog, a lion and a tiger all showing off how many apples they can balance on their heads as they skip, walk the tightrope and roller skate their way through the book.

$11.05 (MEMBER)
$13.81 (NON MEMBER)

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