



THE MATHEMATICAL
ASSOCIATION OF VICTORIA

THE COMMON DENOMINATOR

4/16

THE COST OF YOUR FOOTPRINT



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literacy and numeracy

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low ability students

Bright Sparks is a Presentation College Windsor initiative that teams our Year 9 students with Year 4/5 students from local primary schools. The two and a half day program saw our Year 9 students act as mentors to the primary students and together complete an integrated STEM project focusing on sustainability. This year our big question was 'What is the cost of your footprint?'

STAGE 1 – IDENTIFYING SOME OF THE MAJOR ENVIRONMENTAL ISSUES FACING HUMANITY

After completing some fun team building activities, small groups took part in an art gallery task. The focus here was a series of visual displays which included charts, images, graphs, maps, video clips and cartoons. They highlighted such problems as rubbish gyres in our oceans, global warming, deforestation etc. Students moved around the room recording their responses to De Bono style questions using appropriate colours e.g. What are the facts? (blue),

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FROM THE PRESIDENT

Jim Spithill - ACER

THE COMMON DENOMINATOR

The MAV's magazine published for its members.

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After 30 years teaching mathematics at secondary level I now find myself at ACER engaged in writing mathematics assessments at different levels for Australia, and increasingly across developing countries in Asia and the Middle East.

To start with a blank sheet of paper then write an assessment task that is fit for its intended purpose is a creative process - the 'art' of teaching. We try to bear in mind that the purpose of assessment is not to pigeon-hole a student but to inform us about where each student is in their learning journey. Assessments need to stand up to scrutiny against the demanding statistical criteria of psychometrics - the 'science' of teaching: does the assessment tool have validity and reliability?

And yet, we recognise that the tail should not wave the dog; that 'art' and 'science' are not sufficient to the purpose of guiding each student towards their goals, be they clearly or ill-defined. Which leads us to the notion of the 'craft' of teaching, and the multiplicity of day to day observations and inputs, which may collectively be referred to as formative assessment.

An interesting article in *The Age* discussed the nature of school buildings provided by government since the 1950s has reflected changes in political intention about the purpose of education, from a factory model to one of social awareness and inclusivity. All done on a shoestring budget of course. And

with scant attention to levelling the playing field. But all adding to the complexity of the daily craft of teaching.

Your MAV faces the challenge of anticipating and responding to the changing environment about mathematics education. Your Council has recently completed the appointment process for the new CEO, Peter Saffin. We are confident that Peter will bring a clear business-minded perspective to MAV's activities. Importantly, the MAV is about to engage in the development of its strategic plan for the period 2017-2020. Member feedback reminds us of the importance of:

- preserving the professional standing of mathematics teachers
- providing strong advocacy to government and curriculum authorities,
- assisting members to sort the wheat from the chaff in the educational information overload that might otherwise distract us.

There will be many outstanding presentations at MAV's Annual Conference which epitomise the fine work of Victoria's mathematics education community. See you there!

REFERENCES

www.theage.com.au/victoria/what-do-changes-in-how-schools-are-designed-say-about-our-approach-to-education-20160909-grd0dr.html

CEO: PETER SAFFIN



Securing the role of CEO at the MAV is a great opportunity for me to continue my work in education, something I am dedicated to and passionate about.

As a former science and maths teacher, working to improve educational outcomes in mathematics is something I care about. My role at MAV ties in with my love of STEM and new technology, and how learning is being reinvented for a digital future, and specifically, how we help teachers and students do better.

During my time in educational publishing, even as Managing Director of Macmillan Education, I have always stayed close to teachers and the latest educational trends.

What does success look like for the MAV in future? In a changing educational landscape I will be working with the staff and council to review what we offer. It's clear that professional learning, a fresh conference, high quality products - practice exams and revision lectures - are all important.

Our members will be at the core of any strategy, and we will look at how we provide the best service and communication to members that ensures value for each person. I look forward to meeting and talking with you.

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

Be sure to enter your school into the National Mathematics Talent Quest by. All students from the early years through to Year 12 can enter with the best entries going on to the Asia Pacific Maths Talent Quest.
www.mav.vic.edu.au/mtq

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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WWW.MAVVIC.EDU.AU

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/mathactive

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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THE COST OF YOUR FOOTPRINT (CONT.)

Danuta Wieczorek - Maths Teacher and Learning Enhancement Officer, Presentation College Windsor



An experiment in passive heating.

Why is it happening? (black), How does it make you feel? (red). We reconvened and collected live responses using Google docs.

STAGE 2 – RESEARCH AND DEVELOPMENT

Students used a footprint calculator (www.wwf.org.au/our_work/people_and_the_environment/human_footprint/footprint_calculator/) to determine how many planets it would take to support their current lifestyle. At this point we narrowed in on what we could do to lessen our carbon footprint, specifically in terms of our homes.

We conducted an experiment on passive heating using kits called Power House (experiments in sustainability). Concurrently, groups were asked to research an aspect of sustainable housing and present the information in the form of a graphic organiser. To assist the students with this task we had set up our own Pinterest account where we had collected numerous pins related to sustainable housing.

STAGE 3 – THE CHALLENGE

Before starting the challenge, we showed the students a clip of an earthship being built and they were asked to comment on similarities and differences between typical homes and earthships. We also completed a small construction activity using geostrips to highlight the strength of triangles.

Groups were then given a tub of materials and a set of rules from which to construct their homes. The materials included items such as cardboard, icy pole sticks, pins, masking tape, elastic bands, skewers, balsa wood, straws, balloons and Blu-tack. Planning and testing were encouraged. Students were asked to build a strong yet economic structure that could support weights, withstand winds, collect rainwater and satisfy other constraints.

STAGE 4 – THE CONCLUSION

Many parents attended our final morning where various tests were conducted in order to determine the overall winner. Hairdryers were blown at houses, weights were piled onto roofs, budgets were totalled, watering

cans rained onto the constructions and adherence to rules was checked. The room was abuzz with activity and excitement.

As a final activity, students and visitors were all invited to write a postcard to themselves making a pledge to the planet. What change would they make to their life in order to reduce their carbon footprint? These postcards will soon be sent back to them. Coincidentally, this final morning fell on Earth Overshoot Day, which gave the project even more relevance.

For more detail contact Danuta dwieczorek@pcw.vic.edu.au or Estelle ediez@pcw.vic.edu.au.

FROM STEM TO STEAM

It is useful to incorporate the arts into this project. We read Shaun Tan's *The Red Tree* to highlight the importance of looking for cracks of light, ideas and inspiration rather than dwelling on the negative (www.youtube.com/watch?v=PrmMFFpKxgw).

COMBINING LITERACY AND NUMERACY



TEAM P stands for **Teaching English and Mathematics Primary**. MAV recognises that early years and primary teachers have a brilliant opportunity to teach mathematics and numeracy through literacy and vice versa.

MAV has developed a great line up of speakers for a one-day professional learning event. Teachers can attend this event in person or join online.

Teachers will learn from education leaders and experts in a range of high quality professional learning, this is a great way to create relevant resources to engage teachers of English and mathematics.

All recordings and resources will be available on the TEAM P community website www.teamp.vic.edu.au.

The TEAM P project, managed by the Mathematical Association of Victoria is funded by the Victorian Government Department of Education and Training as part of the Strategic Partnerships Program.

HEAR FROM:

National numeracy ambassador, Simon Pampena
Professional stand up mathematician, combining maths and comedy

Inquiry learning for engaging all students
Dr Judy Hartnett, Making Maths Reasonable

Flip your classroom upside down
Crystal Kirch, Digital Learning coach and flipped classroom expert, California, USA

We can count on more than Frank
Dr Tracey Muir, UTAS and Dr Sharyn Livy, Monash University

Targeted teaching to challenge and engage highly able students in your classroom
Andrea Blake, Professional Learning Catalyst

Developing multi-literacies through ACMI initiatives
Christine Evely, ACMI

Sketchnoting 101
Matt Magain, author and illustrator

Storytelling in games
Leena van Deventer, writer, narrative consultant and games writer, RMIT



Monday 10 October, 9am - 3.30pm.

**You can attend in person or join the event online.
Register now at www.springinto.teamp.vic.edu.au.**

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There is a chronic undersupply of graduates in mathematics, statistics, analytics and information security.

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- Discussion with one of our researchers on one of these topics “Mathematics of Colouring and their Applications” or “Data in our Lives: The Power of Statistics”.
- Interactive activities: “Puzzles and Problem Solving” and “Mathematics of Soap and Optimal Forms”.

> To find out more and to book, visit the website or email smgs@rmit.edu.au

www.rmit.edu.au/sciencecurious



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MATHS CHALLENGES

Ian Lowe and Ellen Corovic - Mathematics Education Consultants, MAV

MULTO

You need a pack of cards, paper and a pen. Remove the picture cards, leaving aces to 10. Shuffle the cards. They will be the numbers for multiplication questions.

Each player draws a 4x4 grid. In each cell write a possible product. All 16 cells must be different.

Now take turns to turn over two cards and say the product. If you have written that number on your 4x4 grid, you cross it out. Continue in turn. The aim is to get any four in a row for 'MULTO'.

MULTIPLICATION WAR

You need a pack of cards, paper and a pen. Remove the picture cards, leaving aces to 10. Shuffle the cards.

Share the cards evenly between the players who leave them upside down.

Take turns to turn over two cards. Say the product. The biggest number wins all the pairs of cards from the other players.

If two players have the same highest product, only those players play off, turning over two more cards, and the winner still wins ALL the cards from everyone else. At the end one player will have all the cards.

BREAD FRACTIONS

Use square slices of bread. Find as many ways as possible to make halves. (There are many more than two!)

Find as many ways as possible to make thirds, quarters, sixths and eighths.

MEASUREMENTS

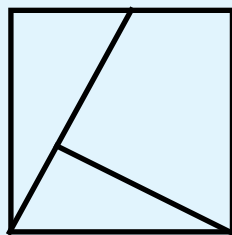
Find out about the measurements used for cooking.

What measurements are used in these activities:

- dressmaking
- gardening (fertilisers, plants)
- cleaning (bottles, jars)
- looking after a pet

What measurements are used in your favourite sport? For all the metric measurements, how are they related?

GEOMETRIC PUZZLES



The square shown is split into three pieces. Draw the square (10 cm x 10 cm) and draw the three pieces and cut them out.

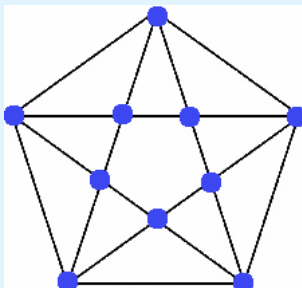
Notice that the

quadrilateral (four sides) has two right angles.

Use two pieces to make a: triangle, trapezium and pentagon.

Use all three pieces to make a: triangle, rectangle, parallelogram, trapezium, pentagon, and quadrilateral.

PENTAMIN



Place one counter on each spot. Players, in turn, remove one counter or two adjacent counters.

'Adjacent' means that they are connected by a line and there are no other counters in between. The winner is the player who picks up the last counter or the last two counters. (<http://nrich.maths.org/>)

TARGET NUMBER

Take it in turns with your partner to write down any two-digit number. You could use playing cards to randomly select one. Then together with your partner, using any one of the four operations (addition, subtraction, multiplication, division) create a list of as many different ways to get to the target number.

Example: Target number 20

$$\begin{aligned}10 + 10 &= 20 \\50 - 30 &= 20 \\5 + 5 + 5 + 5 &= 20 \\4 \times 5 &= 20\end{aligned}$$

Extension: Use more than one process

Example: Target number 20

$$\begin{aligned}(2+3) \times 4 &= 20 \\(90 + 10) \div 5 &= 20\end{aligned}$$

HAPPY CLASS

Your job is to sit the following students in a classroom. They are all very picky.

Abby: next to Lauren and away from Scotty

Lauren: next to Abby and away from Ned

Max: diagonal from Abby and away from Olivia

Scotty: nowhere near Max

Ned: away from Lauren

Olivia: away from Max

Julia: away from Priscilla

Priscilla: away from Julia

How many different ways could you arrange it? Are they in rows or in groups? Can you try it a different way?

SMARTIE SCRAMBLE

Open a packet of Smarties, Skittles or M&M's, the larger the packet the more complex the problem.

- lay them all out on a table or tray.
- what is the total number?
- how many different colours are there?
- how many are yellow? And blue?
- how many other colours do you have?
- can you display the information in a table? What about a graph?
- can you write these amounts as a fraction, percentage or ratio?
- choose two colours to eat. Which ones would you choose? Why?
- which two colours would you give to your friends or family? Why?
- if you ate all the green and orange lollies, what fraction of the bag have you eaten?

Maths challenge puzzles are useful in the classroom and can be used to tune students into a lesson, to challenge early finishers or even as a lesson extension.

MAV's mathematical education consultants can work with schools to increase engagement in numeracy, change approaches to teaching and learning and measure improvements.

Programs can be customised to your school's specific needs. Contact Jen Bowden to find out more, jbowden@mavvic.edu.au.

BECOMING MATHS ACTIVE

Becky Glenton - Creativity and innovation coordinator, Melbourne Girls Grammar

Roshan Lee - Assistant director junior years, Melbourne Girls Grammar



Kellie Morgan (Director of students, junior years), Sally Turnbull (previous acting MAV CEO) and Becky Glenton.

Mathematics is high on our agenda at Morris Hall. We have always been conscious that students develop their first impressions of mathematics during their primary years in the classroom and these experiences are pivotal to how they continue to engage with mathematics.

It is important that we build up their confidence in this subject area. In order to achieve this, our teaching staff have spent many hours striving to ensure that we develop techniques that help our students develop a passion for this subject. When we read about the Maths Active Schools on the MAV website, we immediately knew that this was something we could aim to be accredited for. It was helpful to look through the application guidelines on the website as we could quickly ascertain that we ticked many of the boxes. Looking back on the journey we have taken as a school to get to this point, there were certain clear choices made that allowed for us to get to this destination.

Firstly, a mathematics teaching and learning team was developed. This team comprised of passionate staff who were interested in making a difference in this area of learning. They met weekly to plan ways forward for our students. This team of teachers chose to trial different teaching methods some of which included shared reflections and rich assessment tasks. The team read three professional development books across the year and discussed a chapter each week. The three books were – *The Elephant in the Classroom* by Jo Boaler, *Teaching Number Sense* by Julia Anghileri and *Teaching Mathematics* by Dianne Siemon.

Secondly, our school was designed to have flexible learning spaces that allow for maths to be taught in a variety of ways including whole class, small group and independent learning.

Our planning documentation is consistent throughout the junior campus with warm ups, whole class instruction, independent learning, small group work and reflections being a daily part of the structure of our sessions. As a team, we made a commitment to begin with a maths lesson at least three days each week. Two of these sessions run for 80 minutes each. Our older girls in Year 3 and 4 also undertake maths intensive sessions which go for 40 minutes. These sessions involve two teachers working with a small group of approximately 16 students. We believe that these sessions have been invaluable to our success.

Another factor that has influenced our journey has been our focus on technology. This year has seen the introduction of 1:1 iPads in Prep and Year 1 with a 1:1 laptop program from Year 2 upwards. The iPads are used daily in Prep and Year 1 for mathematics learning and some of the apps used include Book creator, Keynote and Explain Everything.

‘We use the iPads often (particularly the Book Creator app) to have the girls record their thinking. Last week the girls had to take a photo of how they solved an addition problem and audio-record themselves explaining it. The Preps can now do this quite independently.’
- Prep Teacher

We ensure that our lessons involve multiple opportunities for our students to be digitally literate. Our students are active users of Mathletics and participate in online contests through this program. We regularly recognise the achievements of our students through presenting certificates at assembly for their efforts using this platform. All teachers have access to a Hot Maths account which allows them to fully utilise this resource for the effective teaching and learning of our students.

Aside from this, we have been using Khan Academy for just under four years in various capacities at Morris Hall. The engagement of the girls has gone from strength to strength.

The girls engage with Khan Academy for approximately 40 minutes a week and some also work with this program at home.

It is a resource they rely upon when they require further instruction on a mathematical concept. The program has given the girls authentic choice and challenge in their learning and gives them continued confidence and opportunity to be self motivated and independent learners.

As teachers, we are able to use the online platform to track learning data for every student and to highlight any at risk students. We regularly use the video tutorials with the whole group at the start of a session and students often ask to share a particularly useful video with the whole cohort. Our girls are highly engaged with Khan Academy and enjoy the independence it gives them. We have seen an improvement in mathematical skills since the start of the project and we will continue to use this fantastic, free resource that is available to all learners. Our students now understand the basic structure of online course delivery which will enable them to be lifelong learners.

Finally, we have also aimed to get our families involved in the learning of mathematics at Morris Hall. We have done this by hosting mathematics look and learn sessions for our parents. This is a time when the parents are invited into school to experience a maths lesson with their daughter. These sessions are interactive and involve takeaways for the parents in the form of handouts and student learning samples. The parents are always amazed at the learning their daughters undertake. They have also been supportive with assisting their daughters in their learning where possible.

A few weeks ago, we held our annual Maths Week. Across the week we undertook many activities including lunch time activities, whole school competitions and a maths incursion. We were incredibly fortunate that this year as, the week coincided with our Maths Active Schools presentation. Sally Turnbull from the MAV came along to our Assembly and presented us with our plaque. It was a wonderful occasion for which the whole community was able to celebrate our success.



Since becoming a Maths Active School, two of our staff have had the opportunity to attend a MAV Maths Active Schools Event: Learn. Lead. Live. This was a highly engaging day where we were able to learn about the big ideas in mathematics, hear from other Maths Active Schools and interact and learn from like-minded colleagues. This is one of the many positive aspects of being a Maths Active School.

We would highly recommend that you apply to be a Maths Active School. You will be amazed at how much you already do and it gives you an opportunity to network with other schools and learn from fellow institutions. Once you start to write down your achievements, the application writes itself. Our goal is to continue on this learning journey and develop new and exciting opportunities for our students through collaboration with others. We are extremely proud of our award and would like to thank all at the MAV for their continued support and guidance.

BECOMING A MATHS ACTIVE SCHOOL

To become accredited as a Maths Active School, complete the application form at www.mav.vic.edu.au/apply-to-join.html.

ADVANTAGES OF MATHS ACTIVE SCHOOL ACCREDITATION

- Recognition of effective mathematics teaching and learning at your school.
- Networking opportunities with other Maths Active Schools.
- Materials to promote the accreditation of your school.
- Resources to assist promoting maths at home.

For further information visit www.mav.vic.edu.au/maths-active-schools.html or contact Ellen Corovic 03 9380 2399.

INTERNATIONAL MATHEMATICAL MODELING CHALLENGE

Ross Turner - ACER

High school students from several schools around Australia participated in the The International Mathematical Modeling Challenge (IM²C) in 2016. Two Perth teams took out the highest Australian honours, and both went on to be judged in the second highest international award category.

At the International Congress on Mathematical Education (ICME-13) in Hamburg recently, four of the international teams that produced the best reports on the 2016 problem were recognised in an awards ceremony, and the team members presented their work. What these 14-16 year olds had been able to do was truly amazing. But also a bit intimidating. Those teams each produced a short video about their work, which can viewed at: <http://immchallenge.org/Contests/2016/awards/index.html>

However the good news is that those teams, and many of the Australian teams that entered, achieved several benefits from their participation quite apart from the chance for international glory. Working as a team, looking at an interesting and challenging problem from their own perspective, exercising considerable control over a major learning event, and picking up some useful mathematical tools along the way through their investigation of the application of mathematical ideas in a real-world context, were some of the benefits mentioned by participants.

Teams of up to four students from a school, together with a team advisor, can register online to enter the challenge. Teams choose a period of up to five consecutive days within the competition window, and they work together on a centrally set problem during that period. They write a report of their work, and submit it on line for judging.

The IM²C began in 2015. That year, the problem asked teams to devise a model that would assist in designing a schedule for making a movie. In 2016, the problem asked students to consider how the organising committee for an athletics competition could use insurance to minimise financial risks involved in offering incentive payments to attract high performance athletes to the competition.



The team from Perth Modern High School: (L-R) Glen McClelland (supervising teacher), Alex Rohl, Daniel Ho, Virinchi Rallabhandi, Alan Cheng and Ross Turner.

In 2017, the Australian competition window will be from 14 March to 7 April. These dates work best given the 2017 dates for Term 1 across all Australian States and Territories. Schools, teachers, and individuals should register their interest before that time, via the IM²C website.

They will be sent an information pack to help them prepare. Additional resource materials are also available on the IM²C website – these are designed for teachers to use directly with students. It includes samples of student work, advice from the judging panel, and other support materials.

Team registrations are also managed via the website, and all the rules and conditions are presented there. At the beginning of their nominated five day period, the team advisor logs on to the website to gain access to the problem, and passes this on to the team. The clock then starts ticking.

In 2016, most of the Australian teams spent maths class time, and in some cases other school time over three days of the school week, plus two weekend days, in which to complete their work.

Enquiries about the IM²C can be sent to contact@immchallenge.org.au. Visit www.immchallenge.org.au for more information.

VICTORIAN MATHS CHALLENGE

Start the Victorian Maths Challenge now!

The MAV are proud to support the Victorian Government's VicSTEM initiative, the Victorian Maths Challenge. We are looking for schools and their parents who wish to participate in a number of maths challenges from mid-October to mid-November this year. The Challenge has been designed for primary and secondary school families with outreach to metropolitan, regional and rural locations.

MAV will help facilitate Family Maths Nights, career and information evenings during this period as well as support families exploring each of the challenges.

Get your school community excited about the fun ways to solve problems. Capture what you discover with a video, photo, diagram or story. You can even share your findings by submitting to the Maths Challenge website, vmc.global2.vic.edu.au.

The Victorian Maths Challenge is open until 29 November 2016.

Email vmc@mav.vic.edu.au to get involved and receive your Maths Challenge School Pack.

[VICTORIAN] MATHS CHALLENGE!

CHALLENGE: MAKING THE MOST

Using 19 equal lengths, make as many different shapes as possible.

Each person should gather 19 items which are straight and have the same length. These could be 19 toothpicks, matchsticks or pens. These 19 straight items will represent pieces of fence to build your plant enclosures. If you don't have 19 for each person, team up.

Find a flat surface to try out the different shape combinations.

Build the maximum number of different shape enclosures using your 19 'fences'. They may not share any edges. That means there must be a gap between each enclosure.

How many different enclosures can you make? Take a photo to share.

Try again but this time build your enclosures so that they share common edges. Can you build 4, 5 or maybe even 6 different shaped enclosures?

This question is from the Victorian Maths Challenge website (<http://vmc.global2.vic.edu.au/challenges/makingmost/>). It's included here to give you an insight into the types of activities that form the VMC.

Check out the website for more challenges, strategies a glossary of key maths terms and most importantly, email vmc@mav.vic.edu.au to register for the Victorian Maths Challenge.

2016 MAV CONFERENCE

1 AND 2 DECEMBER 2016
LA TROBE UNIVERSITY BUNDOORA

This is going to be one of our best conferences yet! We've listened to your feedback and have made changes to the structure of the two days.

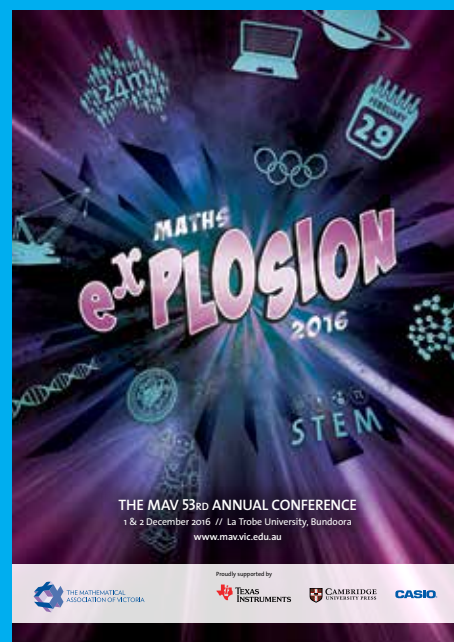
All keynote presentations will be held on each morning of the conference. There won't be a conference dinner this year but instead, Happy Hour will be extended to two hours which will give you more time to network with your colleagues and exhibitors. We've also added keywords to the synopsis book to help you filter sessions.

All sessions are now online so register early to book the sessions that you want.

If you have any questions please contact Julie Allen, jallen@mav.vic.edu.au or telephone 03 9380 2399.

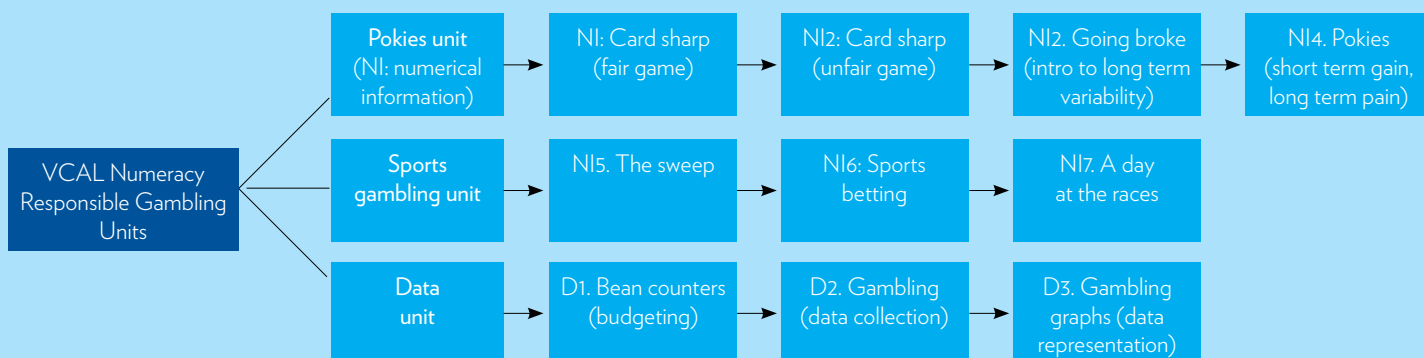
Member Metro: one day	\$284
Member Metro: two days	\$567
Member Non-Metro: one day	\$275
Member Non-Metro: two days	\$559
Non Member: one day	\$371
Non Member: two days	\$742
Student: one day	\$146
Student: two days	\$293

Register for the conference now at www.mav.vic.edu.au.



VCAL STUDENTS LEARN ABOUT RESPONSIBLE GAMBLING

Oliver Lovell, James Gray, Robert Money and Ian Lowe



MAV is currently preparing material on responsible gambling for VCAL. It should be available, through both MAV and the funder, the Victorian Responsible Gambling Foundation, in 2017.

In recent years MAV has developed material for Years 9 and 10 on responsible gambling – lessons and resources that fit with the Victorian maths curriculum. This covers the main areas of gambling growth in recent years: poker machines (still about 60% of gambling), and sports betting.

These same areas are the focus of three new VCAL units: gambling data, pokies and sports betting. Each unit contains three or four lessons, each related both to VCAL learning outcomes and to key ideas about responsible gambling. These ideas are:

1. Chance has no memory, - gambling simulations expose misconceptions about independent events
2. Gambling is fair when all the money gambled is distributed to the gamblers but unfair when the payouts don't match the probabilities, and
3. Short term gain? Long term pain! - the more you gamble the more likely you are to lose money.

All lessons include worksheets for foundation, intermediate and senior levels. Spreadsheets enable teachers or students to generate large quantities of random data quickly. The lesson plans include a common introduction and concluding discussion, but allow teachers to differentiate the level expected using the worksheets.

THE LESSONS

The lessons in each unit are listed and briefly described below.

Data

- Bean counters (budgeting to include gambling money)
- Gambling data (how much is gambled in Australia, who does it and where?)
- Gambling graphs (use of coins, cards, dice and Excel to develop basic probability ideas)
- Gambling survey (follow the nine steps to run a 'proper' survey of gambling in their class, school or community). These steps are:

1. decide what you want to find out
2. decide who to survey
3. select your survey method
4. decide how many people to survey, and how to choose them
5. write the questions for a questionnaire or interview
6. trial the questions
7. conduct the survey
8. analyse the information
9. report the findings

Pokies

- card sharp (how much should you be paid for a win in a fair game, and what happens if it is unfair?)
- going broke (how many games might you play before you lose all your money, and how does this vary?)
- pokies (what is your chance of making money when you play 10, 100 or 1000 games?)

Sports betting

- sweep (compare a fair sweep with an unfair, commercial, sweep where a percentage is taken out first; use the Melbourne Cup in either 2015 or 1930 – won by Pharlap)
- sports betting (how are payouts calculated for win/lose/draw bets in two-player games, and how unfair is it?)
- a day at the races (how does a bookmaker calculate the payouts for horse racing so that there is a margin of profit for the bookmaker?)

Units in humanities are also being developed for VCAL teachers. These, as well as the mathematics units, will be available at www.responsiblegambling.vic.gov.au.

ONE ODD DAY

Andrew Noordhoff - Jells Park Primary School

LESSON FOR YEAR 3 LOW ABILITY MATHS GROUP

One Odd Day by Doris Fisher and Dani Sneed is a picture story book about a boy who wakes up to find that everything around him is a little odd. We centred a lesson around this book for our Year 3 low ability maths group.

OUTLINE

- initial conversation about what odd and even numbers are.
- other uses or meanings for the word 'odd' (for example strange, or chance and probability 'odds').
- read the book *One Odd Day*.
- discussed all the odd things (strange or uneven numbers, as well as the odds of these things actually happening etc) throughout the reading.
- completed a follow up activity: make a very odd creature.

REFLECTION

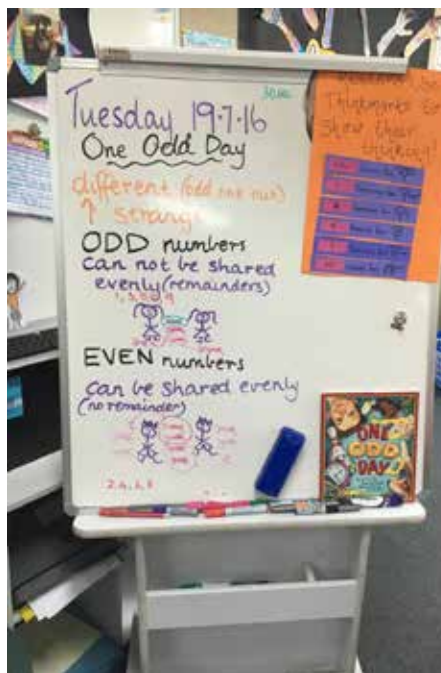
As evidenced by the photos, the students had a fantastic time creating their monsters. Taking away a pencil and allowing them to get creative was a much needed motivation for some of these students who often lack confidence and enthusiasm.

As they created their monster, they consistently checked in to the criteria, ensuring that they had been using odd numbers, and also making the monster look odd or strange.

This activity would be fantastic for the junior years and was a welcome activity for the struggling Year 3 group. They now feel confident with the concept of odd and even numbers.

The book effectively allowed for revision of odd and even, and students took delight in finding odd numbers and items all over the pages of this creative and exciting story.

The teachers notes at the back of the book were also really helpful.



One Odd Day is available from the MAV shop, <http://shop.mav.vic.edu.au>.

Jells Park Primary School is a Maths Active School. To learn more about this initiative, visit www.mav.vic.edu.au/mathsactive.

NUMBER SENSE

Georgie Showell

The importance of number sense in today's society is deteriorating, creating a challenging topic for mathematics teachers everywhere.

Number sense essentially refers to a student's 'fluidity and flexibility with numbers,' (Gersten & Chard, 2001). Most students have a sense of what numbers mean, they understand their relationship to one another and is able to perform mental math, however, understanding the symbolic representations or using these numbers in real world situations can prove to be a challenging task.

As mathematics teachers we have the opportunity to provide positive and meaningful experiences for those we help to learn mathematics (Reys. et al, 2012). It is the underlying theme that we as mathematics teachers must consider mathematics an essential tool for understanding the world, which is why educating students in mathematics needs to continue to advance and keep up with the changes in society.

The negative feelings surrounding mathematics has been a common trend developing for quite some time. This trend has been occurring in primary schooling years for many students and is continuing up, until the completion of Year 10.

At Year 10 level, there are many students of who decide 'enough is enough', 'no more mathematics for me'; 'I don't need it anyway'. But, what many of these students don't realise is that this decision is eliminating many potential career prospects for themselves after completing their VCE. Through their own choice they are giving up on something that is very useful in everyday life, the mathematics curriculum is developed and influenced by the society of Australia, which is developing and changing all the time.

It is through the changes in society that the AusVELS curriculum also changes; mathematics is valued very highly in society by parents, politicians and employers (Reys. et al, 2012). Mathematics is continually in flux; new mathematics is created and discovered so the curriculum must change with this, so that the needs of society can also be met.



Perhaps this lack of motivation and enthusiasm for mathematics has something to do with the lack of number sense so many students are struggling with. Whilst being in the classroom, I have experienced just how little understanding some students have when it comes to explaining an answer they have just achieved.

This demonstrates the lack of understanding and comprehension that students have in term of mathematical reasoning and why they have achieved the answer they did, what this means in relation to the question.

In particular, a large question up for debate is: why are there so many students who struggle to make sense of the real life relationships, that is mathematics? Some of the wording in real life problems can be confusing and leave students answering questions, which don't make logical sense, but if you asked many students why they needed to use a particular formula, they wouldn't be able to tell you. Many of them need summary sheets and would be unable to write down the formula unless it was right in front of them.

In making sense of the mathematical techniques students are being taught, they must acquire an active and enquiring stance, a desire to make sense of it all (Mason, 2002). It is the 'making sense of what is being developed' and techniques that are being used which has created a central concern for many teachers, for quite some time.

The question that all teachers ask themselves is, how can they stimulate students to take the initiative to act upon mathematical ideas and make sense of them as opposed to just attempting to master a succession of technique?

This issue seems like something that would be hit on the head during the early years of numeracy, as students learn that numbers can have different meanings and functions.

However many students fail to make sense of the mathematics they are learning, they are then unable to build on this understanding to be able to learn more mathematics and then use the mathematics they have learnt to solve problems.



Solving problems requires understanding the relations and goals in the problem and connecting the different meanings, interpretations and relationships to the mathematical operations (Booker, 2012).

Many students have the understanding that as long as they know how to 'do the maths', their solutions will be forever solved on the calculator, which to some degree is true. However, the calculator or computer is only as good as the person who operates it and understands and knows how to interpret the outputs. It is evident that in many classrooms, teachers are experiencing the same attitudes. 'When are we going to use this in everyday life?' which forms the basis of questions or statements similar to this.

So why is there a greater need for a more personalised approach to learning? Why do more and more students struggle with the more traditional way of learning, the teacher-directed/teacher-modelled, leading the whole class in a common lesson approach, style of learning?

Perhaps students should have the right to choose how they learn, especially if it's going to be a way in which will help them

learn more effectively, create greater understanding and learn more deeply. Personalised learning can meet all students where they are, motivate them based on their interests and academic levels, accelerate their learning and prepare them to become true lifelong learners (Childress & Benson, 2014).

Through breaking down the traditional barriers of the mathematical classroom where textbook related problems were the major source of work, perhaps students should be exposed to setting their own weekly goals for the types of problems they complete.

Through differentiating student learning, by using a mix of online interactive resources, solving math's problems which relate to real world examples and completing activities in small groups to help promote collaboratively learning and problem solving. Perhaps the students could regain some interest in mathematics through a novelty and personal relevance based approach after all.

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This article originated from coursework for a Masters of Teaching in the Mathematics Teaching Method subject coordinated by Dr Jacolyn Weller at La Trobe University.



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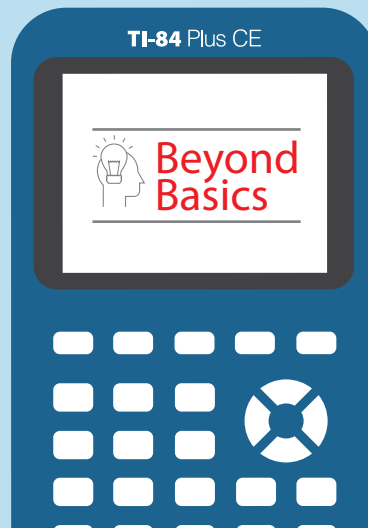
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REVIEW: TEACHING MATHEMATICS

Alicia Clark - St. Mary's School, Whittlesea

Teaching Mathematics: Foundations to Middle Years is a teacher resource book, aimed at teachers of Foundation - Year 9, with a particular emphasis on educating pre-service teachers on the fundamentals of teaching and learning mathematics.

This is the second edition of this resource, republished to link with the Australian Curriculum. This text is a comprehensive, contemporary teaching resource, and what follows is a brief overview of the features of the resource as well as an example of how it could be used effectively in the context of a professional learning team meeting.

The text is divided into six parts.

Part one is a broad introduction to the teaching and learning of mathematics.

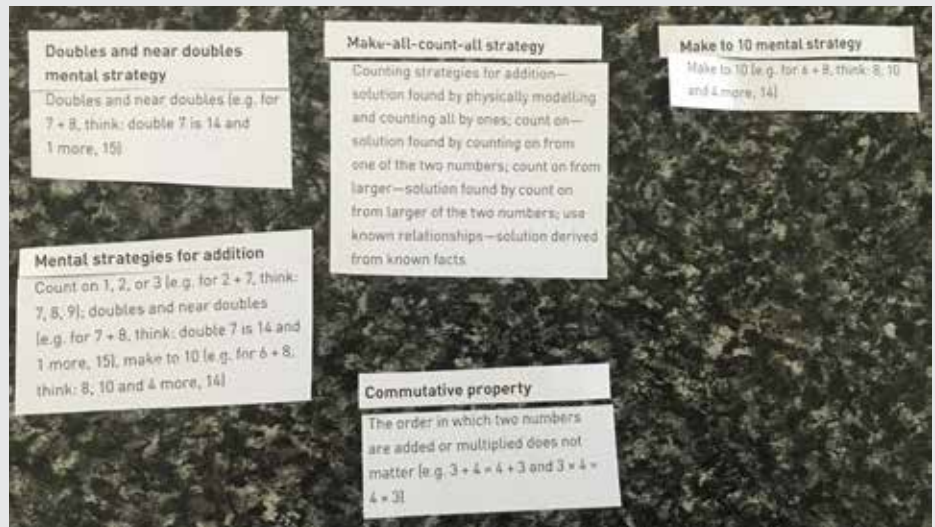
Part two deals with aspects such as thinking, communicating, representing and assessment and reporting.

Part three explores the big ideas in mathematics, beginning with the broad topic of *What is numeracy?* and then explores the areas of number and algebra, measurement and geometry, and statistics and probability in greater depth.

Part four is *Laying the basis for mathematics F - 4* and focuses on the teaching and learning of particular topics such as place value, additive strategies and fractions and decimals.

Part five is *Extending mathematics to the middle years* and includes professional learning and activities for the classroom for topics such as multiplication and division, measurement concepts, and geometric thinking. Parts four and five are designed to provide teachers with background knowledge on each topic as well as numerous activities that can be used in the classroom.

Part six is aimed exclusively at pre-service teachers, and focuses on becoming a professional teacher of mathematics and entering the profession. This part is also a great resource for mentors assisting graduate teachers in obtaining their teaching registration.



Match the term and definition task.

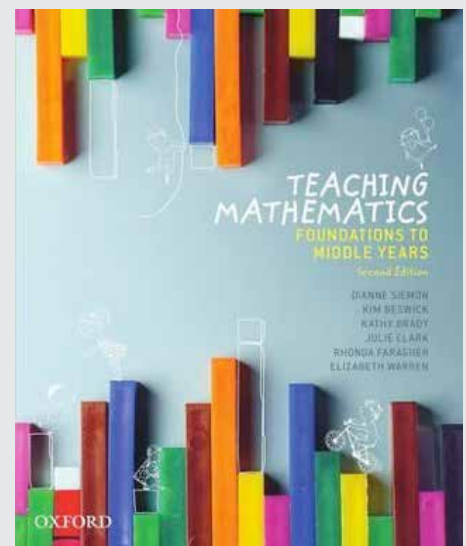
USING THIS RESOURCE IN A PROFESSIONAL LEARNING TEAM MEETING: AN EXAMPLE

The meeting was held with a team of F - 2 teachers, and focused on how we could improve our teaching and learning in the area of addition (an upcoming topic). Chapter 16, pages 343 - 374, as well as parts of the glossary, were used as a resource for this professional learning.

We began by doing an activity, teachers were presented an envelope with some terms and definitions that had been photocopied and cut up from the glossary at the back of the text. The terms focused on words related to the addition concept. Teachers had to attempt to match each word with the correct definition.

We then went straight into some professional reading. The reading was excerpts from Chapter 16, focusing on strategies our students may be using to solve addition problems and how to teach them to move towards more efficient strategies. After reading teachers engaged in professional discussion about the reading, focusing on identifying the addition strategies used by students.

After the reading and discussion, teachers then returned to the glossary terms and definitions, and made changes as needed with the new knowledge gained from their professional reading.



Teaching Mathematics: Foundations to Middle Years is available from the MAV shop, <http://shop.mavvic.edu.au>.

REVIEW: NUMBER LINES

Jono Schmidt - Prep teacher, Stonnington Primary School

NUMBER LINES DR PAUL SWAN AND KELLY NORRIS

Once again, Dr Paul Swan and Kelly Norris have made teaching basic principles of counting, addition, subtraction, multiplication and division easy to teach within your classroom. *Number Lines* is chock-a-block full of simple and easy to use activities to assist the use of number lines.

The scaffolded activities start at basic counting skills before moving onto more challenging activities. These activities support number recognition, basic addition and subtraction skills, and counting up and back by 2s, 5s, 6s, etc. This book provides various problem solving strategies utilising structured and non-structured number lines and assists the development of students' estimation skills and calculate missing numbers.

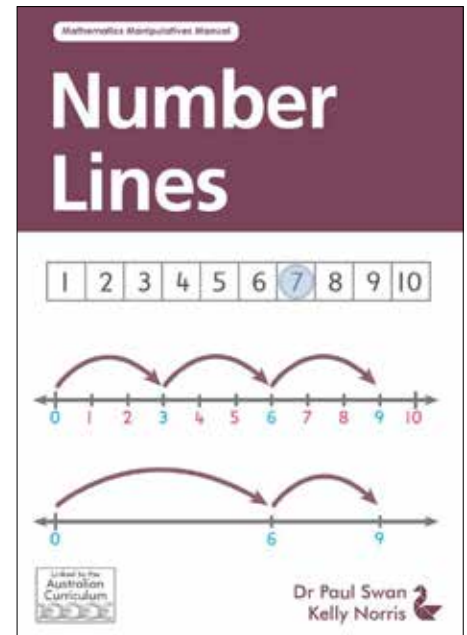
Beginning with visual representations of number lines, tasks can be altered to develop mental computation strategies.

These may be recognising simple patterns when counting or adding, recognising patterns and visual representations of multiplication and division.

To support your teaching practice, *Number Lines* incorporates the appropriate meta-language which is valuable for beginning teachers establishing their topical language lexicon.

The activities contained within this book could be used as introductory lessons, warm-up activities, lesson focuses or support activities for students who are continue to consolidate knowledge in upper primary years. The ready to use games are easy to set-up and easy to understand for early years students.

This book is a valuable tool to add to your teaching arsenal.



Number Lines is available from the MAVshop, order online at <http://shop.mavvic.edu.au>. Member price \$21.45.

2016 MAV PD

During Term 4 2016 a variety of presenters and MAV's own mathematics educational consultants will present workshops focussing on innovative teaching practice. **Make sure you reserve a place by booking online early, www.mavvic.edu.au/pd.**

TOPIC	DATE	YEARS	PRESENTER
2016 Making confident mathematics teachers: teaching junior secondary mathematics - Geometry	8/10/16	7 - 10	Ian Lowe
Working mathematically in the early years	11/10/16	EY	Doug Williams
What's the story?	20/10/16	F - 6	Ellen Corovic
2016 Making confident mathematics teachers: teaching junior secondary mathematics - Statistics and probability	22/10/16	7 - 10	Ian Lowe
Coding - a hackathon for beginners, invent the world	25/10/16	F - 6	Sarah Longhurst
Setting the scene for big picture thinking in 2017	27/11/16	F-12	Dave Tout and Jim Spithill
MAV conference	1/12/16 2/12/16	EY - VCE	Various

WHOLE SCHOOL NUMERACY IMPROVEMENT PROGRAMS IN YOUR SCHOOL IN 2017

MAV's expert maths education consultants have been working with a number of schools in 2016 with great success; measuring improvements in NAPLAN results, changing approaches to teaching and learning, and improving engagement in numeracy. We can customise a program to meet your school's specific needs. Email Jen Bowden jbowden@mavvic.edu.au for further information.



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MAV SOLUTIONS 2016: VCAA SAMPLE EXAMS

VCE

With the implementation of the revised study design in 2016, VCAA has produced sample examinations.

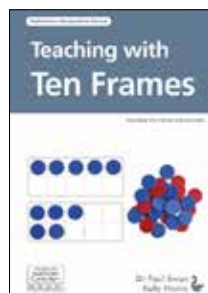
To assist students to prepare effectively for VCE mathematics examinations, the MAV has produced solutions to the 2016 sample VCAA examinations 1 and 2 for Specialist Mathematics, Mathematical Methods and Further Mathematics.

Each solution set features fully worked solutions for all sections, advice on solution processes and permission for the purchasing institution to reproduce copies for its students.

This item is a password protected online resource.

INDIVIDUAL STUDY **\$95 (MEMBER)**
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ALL STUDIES **\$222 (MEMBER)**
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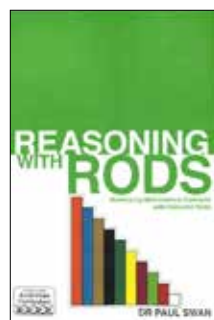


TEACHING WITH TEN FRAMES

F-2

Make the most of the ten frame as a teaching tool in your classroom. Ten Frames and ten strips are the ideal tool for supporting children to learn basic number concepts. This book includes games to play with ten frames and five frames.

\$21.45 (MEMBER)
\$26.81 (NON MEMBER)



REASONING WITH RODS

F-6

Coloured Rods or Cuisenaire Rods are often under-utilised in schools. Because a lot of teachers don't really know how to use them to their full potential, the rods are left in the cupboard, getting dusty. This book will help teachers gain the most from this simple but effective resource. There are sections on early number as well as algebra, the development of fraction concepts and tasks that make you think or reason about mathematics.

\$21.45 (MEMBER)
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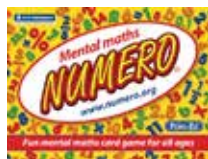
2016 MAV TRIAL EXAMS

VCE

Prepare effectively for VCE mathematics examinations with the MAV's trial exams for Mathematical Methods (CAS), Further Mathematics and Specialist Mathematics studies. Each trial exam features original questions, highly relevant to the current course; fully worked solutions for all sections and clear marking schemes. Exam formats are similar to those used by VCAA. The purchasing institution has permission to reproduce copies for its students. This item is a password protected online resource.

INDIVIDUAL STUDY **\$193.28 (MEMBER)**
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ALL STUDIES **\$446.48 (MEMBER)**
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NUMERO PLAYING CARDS

F-6

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The game is played in developmental stages that allow the players to progress to their level of ability - or the teacher to direct players as a strategy to develop new concepts.

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