THE MATHEMATICAL ASSOCIATION OF VICTORIA

# PRIME NUMBER

The primary journal of The Mathematical Association of Victoria

01/26

**INSIDE**

# INSIDE THIS ISSUE

VOLUME 41, NUMBER 1. 2026

## ON THE COVER

The cover image emphasises the importance of concrete representations as the foundation for developing conceptual understating in mathematics.



THE MATHEMATICAL ASSOCIATION OF VICTORIA
Cliveden, 61 Blyth St, Brunswick VIC 3056
(03) 9380 2399
office@mav.vic.edu.au
ABN: 34 004 892 755



ISSN 0816 9349
Registered by Australia Post, publication number VBG 2502.



**Stay connected**

mav.vic.edu.au
@maths.vic
@maths_vic
@maths-vic
@maths.vic

# EDITORIAL

**Aylie Davidson, Editor**

Welcome to Term 1, 2026. I hope the break provided some rest and time to recharge before another busy year begins. With the Victorian Curriculum Mathematics v2.0 now in full swing in many schools, 2026 feels like a significant year for primary mathematics across the state. There is also plenty to look forward to professionally, including the Melbourne Mathematics Conference (MMC26) on 3 and 4 June, which will focus on connecting theory and practice across early childhood, primary, and secondary settings.

This issue of *Prime Number* offers a strong mix of practical ideas and deeper thinking about what makes an effective mathematics program. Leanne Ronalds opens with an insightful piece on building fluency through regular Proficiency Workshops – work that clearly shows how understanding, fluency, reasoning, and problem-solving reinforce one another when deliberately planned together. Suzi Talaia provides a detailed place-value lesson that puts problem-solving at the centre, while Jane Hubbard explores the role of self-determination theory in creating optimal learning conditions.

Further in, John Gough connects estimation to a real building-site context, Emma Doyle offers guidance for numeracy leaders, and Bianca Burd highlights the mathematical demands of a commercial manager's role in the fashion buying industry. Michaela Epstein's *Guess My Number* investigation and Mike Nelson's *Vessel* puzzle round out a set of ready-to-use activities. I also offer some insights on how teams might use meeting agendas to make the most of collaborative planning time.

Taken together, the articles touch on curriculum design, student motivation, classroom strategies, leadership, and workplace connections – the various elements that combine to form a balanced, coherent mathematics program. For me, personally, developing learning sequences using the concrete-representation-abstract approach, and including a range of task types, that incorporates the four proficiencies, is always at the forefront of my mind when planning and teaching.

As always, I welcome your feedback or ideas for future issues. Feel free to email primenumber@mav.vic.edu.au.

# BUILDING MATHEMATICAL FLUENCY THROUGH PROFICIENCY WORKSHOPS

**Dr Leanne Ronalds, Mount View Primary School**

In 2025, our Year 4 PLC undertook an inquiry into mathematical fluency assessment findings that many students could recall facts, yet struggled to use them flexibly. This observation prompted us to question what it meant to be fluent in mathematics. Was fluency simply about accuracy and speed, or could it also describe the confidence and adaptability students demonstrate when reasoning, connecting ideas and applying their understanding to new situations? These questions guided our inquiry and opened a broader conversation about how fluency is developed, practised and observed in the classroom.

## WHAT IS FLUENCY?

Kilpatrick and colleagues (2001) introduced five interwoven proficiencies:

1. Conceptual understanding
2. Procedural fluency
3. Strategic competence (problem solving)
4. Adaptive reasoning
5. Productive disposition

to describe what they believed 'necessary for anyone to learn mathematics successfully' (p. 116). They defined fluency as 'skill in carrying out procedures flexibly, accurately, efficiently, and appropriately' (p. 116).

Building on this work, the Victorian Curriculum v2.0 (VCAA, 2024), describes fluency as:

> ... provid[ing] opportunities for students to develop, practise and consolidate skills; choose appropriate procedures; carry out procedures flexibly, accurately, efficiently and appropriately; and apply their recall of factual knowledge and understanding of concepts readily. Students are fluent when they connect their conceptual understanding to learned strategies and procedures, make reasonable estimates and calculate answers efficiently, and choose and use computational strategies efficiently; when they recognise robust or multiple ways of answering questions; when they choose appropriate representations and approximations; when they understand and regularly apply definitions, facts and theorems; and when they can manipulate mathematical objects, expressions, relations and equations to find solutions to problems.

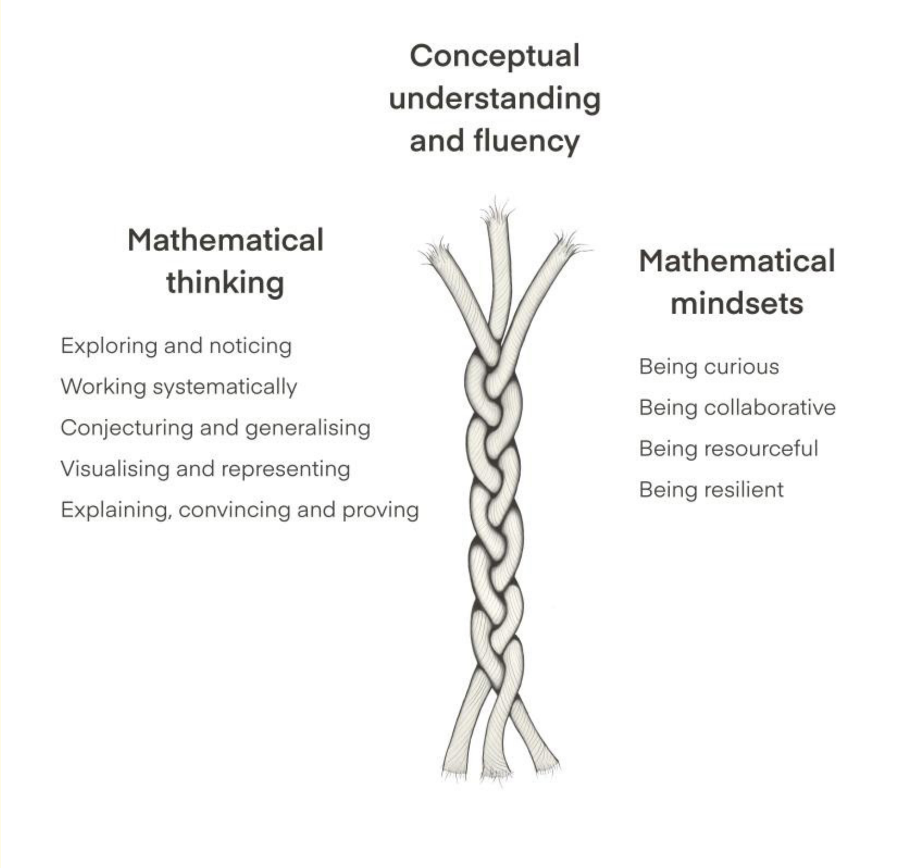



*Figure 1. The NRICH Rope Model for nurturing successful mathematicians.*

In other words, fluency grows through number sense and flexibility rather than speed or memorisation (Boaler, 2015). It develops when students choose, adapt and justify strategies that make sense to them.

Moreover, Boaler (2015) also warns that 'misinterpretations of the meaning of the word fluency … continue to emphasise rote memorisation, encouraging the persistence of damaging classroom practices.' Recognising that fluency is more than 'drill and practice', was also a focus of our professional conversations.

To deepen our understanding about the multifaceted nature of fluency, we turned to the NRICH Rope Model (Figure 1.), that illustrates conceptual understanding, fluency, mathematical thinking and mathematical mindsets as intertwined strands of the same rope. When one strengthens, the others grow stronger too.

For our PLC, we aligned this analogy closely with the four proficiencies of the Victorian Curriculum: understanding, fluency, reasoning and problem solving, providing us with a focus for collaborative planning and reflection.

Taken together, these perspectives guided us to view fluency as mathematical thinking in action, developed through reasoning, understanding and problem solving, and strengthened by them in return to give mathematics depth and meaning.

## THE IMPORTANCE OF CONSOLIDATION WHEN BUILDING FLUENCY

As argued earlier, fluency does not stand alone. Rather, fluency is dependent on reasoning, understanding, and problem solving, and vice versa. This led us to focus on what helps learning endure and transfer beyond a single unit of work. We found that fluency developed most effectively through deliberate consolidation, where students revisit ideas, reason through them again and apply them in new ways.

Consolidation moves learning beyond recall by asking students to connect ideas and test strategies in fresh contexts. Dreyfus and Tsamir (2004) described consolidation as the process through which knowledge becomes stable and transferable, allowing learners to use it confidently in new situations. This aligns with what we see in classrooms: fluency emerging from thinking flexibly about known ideas rather than a focus from speed or repetition.

Connected to the description of consolidation above, AERO's Revisit and Review (2024) guide identifies spacing, retrieval and variation as essential for retention and transfer, one aspect of consolidation. Spacing strengthens recall over time. Retrieval without prompts builds independence. Variation invites new connections. These principles describe fluency in action as flexible, accurate and efficient thinking that draws on reasoning and understanding.

To make these various aspects of consolidation visible, the team developed weekly Proficiency Workshops to revisit recent mathematical concepts through new representations, in new student groups, and with varied problems. In other words, rather than treating fluency as a warm-up or add on, the Proficiency Workshops embedded the proficiencies together while consolidating previously taught ideas and skills.

## THE DEVELOPMENT OF PROFICIENCY WORKSHOPS TO CONSOLIDATE LEARNING

The intention of our Year 4 Proficiency Workshops was to give fluency a clear and connected place within our mathematics program. Each workshop invites students to revisit and extend their learning through varied contexts, discussion and reasoning. In these workshops, understanding, fluency, reasoning and problem solving are planned for together.

Moreover, our approach to developing fluency extends beyond the weekly Proficiency Workshops. Across all mathematics planning, we aim to design learning experiences that connect the proficiencies and promote flexibility in thinking. This includes the use of flexible groupings, where students work with different peers and across varying levels of challenge. We have found that when groupings are fluid, students engage in richer mathematical dialogue, encounter diverse strategies and build adaptive expertise.

In this way, flexible grouping supports the same kind of flexible thinking that defines fluency itself. The Proficiency Workshops then provide a deliberate structure within this broader approach to further extend thinking by mixing students across classes and contexts, giving them new ways to connect ideas and apply their understanding. We view this as a sustainable approach to revisiting and consolidating learning.

## PROFICIENCY WORKSHOPS IN ACTION

Our Proficiency Workshops are a structured approach to consolidation that simultaneously strengthens all four proficiencies. They are not for repetition or correction but for exploration, representation and explanation.

Students work with previously taught ideas in varied ways, with different students, which supports fluency as flexible thinking rather than recall. In line with AERO's guidance on revisit and review, our workshops use spacing, retrieval and variation to promote lasting learning. As Davidson (2022) notes, effective planning anticipates student thinking and designs for variation. By providing multiple entry points, our workshops connect recall with reasoning and make fluency visible in action.

The following example shows a workshop designed to consolidate the concept of time as a measurable quantity. In the week prior, students explored time in class. We then used this learning to regroup students for a workshop that revisited the concept through new contexts. All six groups worked with the same big idea through different representations and challenges. The variation was not about ability but about entry points, so every learner could revisit known content while strengthening fluency as flexible thinking and developing reasoning, problem solving and understanding together. See Table 1.

Across all workshops, the 'bigger picture' is the shared journey towards flexible and connected mathematical thinking for all students. The purpose remains the same for all groups; to consolidate previously learned mathematics content in order to connect and build mathematical proficiency through deliberate variation.

## WHAT WE HAVE NOTICED IN PRACTICE

Since introducing our weekly Proficiency Workshops, we've seen shifts in both student learning and teacher practice. These shifts align with what Boaler (2015) describes as 'fluency through number sense and flexibility,' rather than memorisation or speed. The most notable shifts to date have been:

# BUILDING MATHEMATICAL FLUENCY THROUGH PROFICIENCY WORKSHOPS

Dr Leanne Ronalds, Mount View Primary School

CONT.

### CONFIDENCE AND COMMUNICATION

Students now talk about mathematics with more confidence and less fear of being wrong.

They are more willing to explore multiple strategies, explain their reasoning, and listen to others' ideas. This reflects Boaler's call for classrooms that promote 'mathematical play and exploration' as the path to genuine fluency.

### FLEXIBILITY AND UNDERSTANDING

We've noticed students choosing from a range of strategies depending on the problem, rather than relying on one method. They demonstrate what Boaler calls adaptable thinking, using what they know in new ways, and they link new learning to prior knowledge more readily.

### CONNECTION AND TRANSFER

Concepts once treated as discrete now connect naturally across strands. Students draw on number relationships to support measurement, geometry and statistics, showing that fluency strengthens reasoning and understanding rather than sitting apart from them.

### ENGAGEMENT AND MINDSET

There has been a visible change in students' attitudes toward mathematics. Students describe these sessions as 'less about getting it right and more about figuring it out' due to more focus on discussion, exploration and variation as opposed to repetition alone.

### COLLABORATION AND CONSISTENCY

Shared planning has created a common professional language across classes. Teachers use consistent models and representations, making transitions smoother for students and strengthening collective expertise.

These outcomes reflect both Davidson's (2022) emphasis on 'designing with variation and anticipation' and Boaler's (2015) reminder that mathematical fluency grows through flexibility, curiosity and understanding.

By reclaiming fluency as a shared professional focus, we've found a way to keep mathematical thinking connected, confident and alive.

## BRINGING THE PROFICIENCIES TOGETHER

Each workshop reflects the belief that mathematical learning deepens when students revisit ideas through varied contexts and representations. Consolidation offers deliberate opportunities to think flexibly, connect strategies and communicate reasoning.

Boaler (2015) points to meaningful exploration and sense making as conditions for fluency, while Davidson (2022) highlights planning for variation to reveal mathematical thinking. This design aligns with the Australian Curriculum, where fluency is more than recall and involves flexible, efficient and confident application of knowledge. In this way, consolidation becomes the space where understanding, fluency, reasoning and problem solving work together.

## REFERENCES


AERO (2024). *Revisit and Review: Practice Guide.* Australian Education Research Organisation.

Boaler, J. (2015). *Fluency Without Fear: Research Evidence on the Best Ways to Learn Math Facts*. Stanford University.

Davidson, A. (2022). *Applying a Model for Planning in Mathematics (MPM)*. Mathematical Association of Victoria.

Dreyfus, T., and Tsamir, P. (2004). Ben's consolidation of knowledge structures about infinite sets. *The Journal of Mathematical Behavior*, *23*(3), 271–300.

Kilpatrick, J., Swafford, J., and Findell, B. (Eds.). (2001). *Adding It Up: Helping Children Learn Mathematics.* National Academies Press.

NRICH. (n.d.). *Nurturing successful mathematics: The rope model.* Retrieved from https://nrich.maths.org/nurturing-successful-mathematicians-rope-model

VCAA. (2024). The Victorian Curriculum: Mathematics version 2.0. Retrieved from https://f10.vcaa.vic.edu.au/learning-areas/mathematics/introduction

| GROUP FOCUS | LEARNING INTENTION | SAMPLE TASK | HOW THE FOUR PROFICIENCIES WORK TOGETHER |
|---|---|---|---|
| 1. Exploring time concepts | I am learning to read time to the hour and half hour and describe daily events. | Match digital and analogue times, then order events in a school day. Explain one event that could happen between two others. | **Understanding:** Connecting time words and clock faces.<br>**Fluency:** Recognising patterns and connecting representations.<br>**Reasoning:** Justifying the order of events.<br>**Problem solving:** Adjusting a schedule to test reasoning. |
| 2. Representing time | I am learning to show time to five minute intervals and explain what comes before and after. | 'If it is 2.15pm now, what time was it 20 minutes ago?' Represent this on a clock and explain two ways to check your answer. | **Understanding:**Linking skip counting to time.<br>**Fluency:** Using efficient strategies to adjust time.<br>**Reasoning:** Predicting and justifying change.<br>**Problem solving:** Testing methods visually or mentally. |
| 3. Calculating duration | I am learning to calculate elapsed time within the hour. | 'The movie started at 4.05pm and ended at 4.47pm. How long did it go for?' Show and compare two different methods. | **Understanding:** Recognising duration as difference.<br>**Fluency:** Applying and transferring number relationships to time.<br>**Reasoning:** Comparing and evaluating strategies.<br>**Problem solving:** Selecting and explaining efficient methods. |
| 4. Linking representations | I am learning to represent elapsed time in more than one way and explain my reasoning. | 'The train left at 3.47pm and arrived at 5.12pm. Show this on a timeline and a number line, then explain which representation makes the reasoning clearer.' | **Understanding:** Translating between representations.<br>**Fluency:** Coordinating and connecting multiple models.<br>**Reasoning:** Explaining how representations support understanding.<br>**Problem solving:** Choosing the most effective representation for a new context. |
| 5. Applying to context | I am learning to solve elapsed time problems in real life situations. | 'If training starts at 6.40pm and runs for 1 hour 25 minutes, when will it finish? What if training ran 15 minutes longer?' | **Understanding:** Translating and adjusting word problems.<br>**Fluency:** Using efficient strategies in real contexts.<br>**Reasoning:** Justifying and comparing solution paths.<br>**Problem solving:** Applying reasoning to unfamiliar contexts. |
| 6. Generalising and comparing | I am learning to compare time durations and justify which is longer and why. | 'Three flights leave at different times and travel for different durations. Which arrives first? Explain your reasoning and create a new example that would change the outcome.' | **Understanding:**Identifying and analysing structure across problems.<br>**Fluency:** Coordinating and extending multiple time calculations.<br>**Reasoning:** Evaluating and generalising relationships.<br>**Problem solving:** Creating and testing variations to explore efficiency. |

*Table 1.*

Victorian Academy of Teaching and Leadership

# Leading excellence and equity in mathematics

## Mathematics suite

The Academy's mathematics suite is a range of evidence-informed professional learning programs that support improved mathematics outcomes for students in your school. They provide professional learning at the classroom and leadership level – from pedagogy and practice to leading improvements in mathematics outcomes school-wide.

The updated suite is aligned with the Department of Education's Victorian Teaching and Learning Model 2.0 and the Mathematics Position Statement, as well as other explicit instruction frameworks applicable to schools in all sectors.

**Programs include:**

- Leading Mathematics
- Mathematics Pedagogy and Practice
- Mathematics Pedagogy and Practice: Facilitator Program.

Programs are delivered onsite and online across the Academy's centres across Victoria.

To apply or for more information scan the QR code, or talk to an Academy team member on 03 9084 8500 or at your closest centre.

Or search 'Mathematics' on the Academy website: www.academy.vic.gov.au

VICTORIA State Government | Department of Education

Independent Schools Victoria

Victorian Catholic Education Authority

# A PROBLEM SOLVING LESSON IN PLACE VALUE

Suzi Talaia, Kings Park Primary School

Recently, my Year 2 class engaged in a rich problem-solving investigation titled *What's My Name Worth?* This activity was designed to deepen students' understanding of addition, place value, and number patterns. The lesson was structured around Sullivan's well-established Launch–Explore–Summarise model (see Sullivan et al., 2021). This framework supports effective mathematics teaching by promoting structured problem-solving, reasoning and student engagement.

## ACTIVATING PRIOR KNOWLEDGE THROUGH A NUMBER TALK

To activate students' prior knowledge, I began with a Number Talk (see Figure 1.) using an image of hundreds blocks arranged in certain ways.

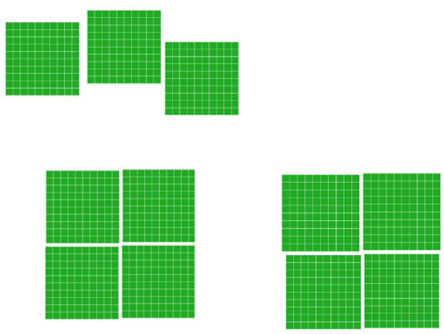


*Figure 1. Hundreds blocks used in the Number Talk.*

Students were prompted with the questions, 'What do you notice?' and 'What do you see without counting?' to encourage visual reasoning. Some students recognised:

- the two 4-hundreds groups as a double, calculating 8 hundreds, plus the remaining 3 hundreds to make 11 hundreds, or
- 1,100, promoting renaming and understanding of place value.

I recorded students' thinking on the board (4 hundreds + 4 hundreds + 3 hundreds = 11 hundreds, or 400 + 400 + 300 = 1,100).

One student even expressed it as 2 × 400 + 300. Reasoning was elicited with questions such as 'If we added another hundred, what would happen? What if I took away two hundreds?'

The intent of this number talk was to scaffold students with strategies and ways to approach the main problem for the lesson, and to prepare them for independent exploration. Thus, having explored these strategies, students were now ready to launch into the main task.

## LAUNCH

The main task of the lesson was launched with a visual (see Figure 2.) and the prompt:

'Today we're going to explore how much different letters are worth. For example, P is worth 3 hundreds and X is worth 8 hundreds. One student in our grade has a name worth 11 hundreds. I wonder who it could be. Show your thinking in as many ways as you can?'

| | | | | | | |
|---|---|---|---|---|---|---|
| $A_1$ | $B_3$ | $C_3$ | $D_2$ | $E_1$ | $F_4$ | $G_2$ |
| $H_4$ | $I_1$ | $J_6$ | $K_5$ | $L_3$ | $M_3$ | $N_1$ |
| $O_1$ | $P_3$ | $Q_{10}$ | $R_2$ | $S_1$ | $T_1$ | $U_1$ |
| | $V_4$ | $W_4$ | $X_8$ | $Y_4$ | $Z_{10}$ | |

*Figure 2. The value of each letter used in the main task.*

Before beginning the main exploration, we discussed possible problem-solving strategies. Students suggested several approaches such as:

- making a model of the numbers representing the letters.
- writing number sentences to represent different names.
- selecting a name and checking its total value.

This discussion highlighted students' emerging mathematical thinking and set the stage for independent and then collaborative exploration.

## EXPLORE

Students first attempted the problem individually. From the start, they were aware of what their goal was – they knew exactly what they needed to do to be successful: calculate the total value of names using the assigned letter values.

Students calculated the value of different names in the class using the visual display of letters with assigned hundreds values (see Figure 2). This visual supported their reasoning by allowing them to see the value of each letter clearly (e.g., P = 3 hundreds, X = 8 hundreds) and use it as a reference while adding the values together.

To solve the problem, students applied a range of strategies introduced during the number talk, including using number cards (hundreds), recording place value, using MAB blocks (hundreds flats), grouping, near doubles, and simple multiplication. Connecting letters to numbers made abstract place value concepts more concrete and supported students in developing flexible problem-solving approaches.

Those needing extra support received an enabling prompt using tens instead of hundreds: 'P is worth 3 tens. X is worth 8 tens. A student in our grade has a name worth 11 tens (110).' Manipulatives such as ten-blocks were also available for support.

Next, students worked in pairs, exploring the problem using a variety of solution strategies. Some used expanded notation (e.g., 300 + 100 + 300 + 400), others used physical MAB hundreds blocks to model their thinking, and a few extension students translated the problem into algebraic expressions like: (3 × 100) + (4 × 100) + (1 × 100) = 1,100 (see Figure 3). Scaffolds were provided to respond to learners' needs – some worked with tens to build confidence, while others explored bracketed expressions and larger numbers as the extending prompt.

# A PROBLEM SOLVING LESSON IN PLACE VALUE (CONT.)

**Suzi Talaia, Kings Park Primary School**

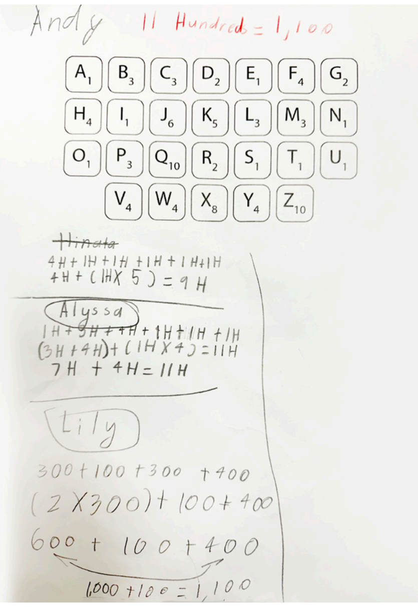



*Figure 3. A student using algebraic expressions to record their thinking.*

The explore phase encouraged mathematical flexibility and reinforced place value understanding through hands-on exploration and collaborative problem-solving.

Students were highly engaged and experimented with many classmates' names. Notably, there were two students in the class whose names were worth 11 hundreds. Once one solution was identified, I challenged students to find the other.

This lesson also highlighted the importance of a growth mindset in mathematics. In classrooms where students feel safe to take risks and explore without anxiety, they are more willing to test strategies, make mistakes, and persevere (Boaler, 2016).

Presenting maths as accessible and engaging allowed students to approach problems with curiosity and confidence, deepening their conceptual understanding and enjoyment of learning. Moreover, 'develop[ing] a positive disposition towards mathematics…' is one of the aims of the Victorian Curriculum v2.0 Mathematics (VCAA, 2023).

## SUMMARISE

Students shared diverse solution strategies and discussed the efficiency of different approaches. I intentionally selected and shared student responses in order of difficulty to explicitly highlight and model effective strategies and scaffold thinking.

One student began with the name LUKA (see Figure 4.), covering the letters L, U, K, and A with blue counters. They wrote the name and broke down the numbers linked to each letter, exploring addition and grouping strategies.

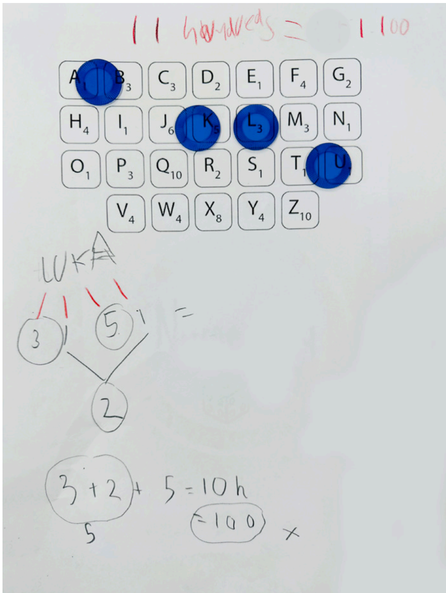



*Figure 4. Student sample name, LUKA.*

The student combined numbers in parts (e.g., 3 + 2 = 5 and 5 + 5 = 10) and related this to hundreds. Since 10 hundreds is 1000, they realised this could not be Luka, showing they were connecting single-digit addition to place value. Overall, they practised addition and place value reasoning, demonstrating how smaller numbers can be grouped and represented as larger values.

Many students used place value language, such as 'three hundreds plus four hundreds,' when explaining their solutions. I then responded to student thinking by explicitly teaching to get students to notice the additive structure and support students' mental calculations, reinforcing what students did. For example, when calculating Sophie:

S = 1

O = 1

P = 3

H = 4

I = 1

E = 1

### Standard addition

1 + 1 + 3 + 4 + 1 + 1 = 11 hundreds (1,100)

100 + 100 + 300 + 400 + 100 + 100 = 1,100

### Grouping strategies

- Combine the ones: 1 + 1 + 1 + 1 = 4 hundreds or 4 ones = 4
- Sum of P + H: 3 + 4 = 7 hundreds (near double)
- Combine groups: 4 + 7 = 11 hundreds

This aligned with the Victorian Teaching and Learning Model (VTLM 2.0), which highlights that 'teachers fully explain and effectively demonstrate what students need to learn' (Department of Education, 2024). Through this explicit modelling and shared reasoning, students developed their understanding of place value and addition while deepening their mathematical language. After this summary, students consolidated their understanding by finding other names worth 11 hundreds and use some of the strategies we discussed. (see Figure 5.)

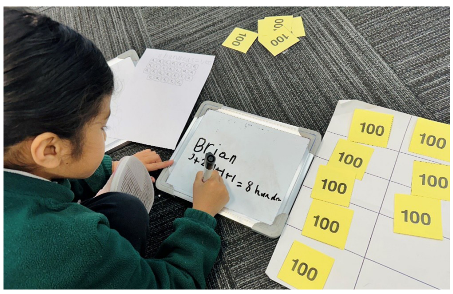



*Figure 5. A student consolidating their understanding of strategies.*


*Figure 6. Modelling how to group numbers.*

During this stage I also extended some students. For example, Figure 6 shows me modelling how to break down and solve equations step-by-step using visual supports.

When the lesson concluded, the enthusiasm demonstrated in this lesson was evident as they asked to extend the activity: 'Can we find out what my family's names are worth next time?'

This lesson exemplifies how Sullivan's Launch – Explore – Summarise cycle fosters deep engagement with mathematical concepts, supporting problem-solving, conceptual understanding, and mathematical communication.

By integrating concrete materials, rich language, and reflective discussion, and responsive teacher actions during the lesson, the lesson created inclusive opportunities for all learners to see themselves as capable mathematicians and advance students mathematical thinking.

## REFERENCES

Boaler, J. (2016). *Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages and Innovative Teaching.* Jossey-Bass.

Department of Education. (2024). Victorian Teaching and Learning Model (VTLM 2.0). State Government of Victoria. Retrieved from https://arc.educationapps.vic.gov.au/learning/sites/vtlmresources

Sullivan, P., Bobis, J., Downton, A., Feng, M., Hughes, S., Livy., S., McCormick, M., & Russo. J. (2021). An instructional model to support planning and teaching student centred structured inquiry lessons. *Australian Primary Mathematics Classroom*, *26*(1), 9–12.

VCAA, (2023). The Victorian Curriculum version 2.0: Mathematics Introduction. Retrieved from https://victoriancurriculum.vcaa.vic.edu.au/mathematics/mathematics-version-2-0/curriculum/f-10.

# VESSEL

Mike Nelson, Gordon Primary School

## USE THIS PICTURE AS A STIMULUS FOR LEARNING TASKS.

Vessel is a tourist attraction found in Hudson Yards in New York City. This honeycomb-like structure rises 150 feet, has 154 flights of stairs, 2,500 steps and 80 landings for visitors to climb.

## FOUNDATION

On the first three levels, I noticed the first level had someone wearing a red shirt, the second had someone wearing a blue shirt and the third level had a yellow shirt. If this pattern continued, what would the person on the seventh level be wearing?

### ENABLING PROMPT

There are colours on the first three levels: red, blue, yellow. Can you write this pattern out at least two more times (red, blue, yellow, red, blue, yellow)?

Now match each colour to a level number. Which colour lines up with Level 7?

### EXTENDING PROMPT

If the colour pattern repeated every three levels (red, blue, yellow), what colour would be on Level 25. Explain how you figured it out.

## YEARS 1 and 2

The Vessel has 154 flights of stairs. If you stood at the bottom, what would be an efficient way to count them all?

### ENABLING PROMPT

Could you count the stairs in smaller groups, like 5 or 10 at a time? How could you keep track of the groups so you don't lose count?

### EXTENDING PROMPT

Can you find a faster way to count all 154 stairs without counting one by one? How could you check your answer to make sure it is correct?

## YEARS 3 and 4

The Vessel primarily uses hexagons to make it look like a honeycomb. What other shapes, other than a hexagon, can you see have been used in the design?

The Vessel lets 100 people in every half an hour. It takes 30 minutes to climb and 15 minutes to explore the top landing. If the first group is let in at 10, how many people will be in the Vessel at 11.30am?

### ENABLING PROMPT

Look carefully at one section of the building. Trace the outline with your finger. Can you name the shapes you see inside that one section (for example: triangles, rectangles, quadrilaterals)? Choose one shape you found and describe how you know it's that shape (number of sides, straight edges, corners).

Draw a simple timeline starting at 10am and mark when each group enters. Write how long each group stays inside (45 minutes). Shade in the parts of the timeline when the groups are still inside. Which shaded groups include 11.30am? How many people is that?

### EXTENDING PROMPT

Pick two different shapes you can see in the design. Explain how they are similar and different using mathematical language (sides, angles, parallel lines). Explain why you think the architect might have used these shapes together in the design. How do these shapes help the structure stay strong or look interesting?

If the Vessel allowed groups to stay for 1 hour instead of 45 minutes, how many people would be inside at 11.30am? What if they allowed 120 people every half hour instead of 100? Explain your thinking using a timeline, repeated addition, or both.

## YEARS 5 and 6

The designer, Heatherwick used hexagons to create the design of Vessel. What other shapes could he have used that would have created the same tessellation effect? Draw the side of the building, what would it look like using different shapes?

The Vessel has 2,500 steps and 154 flights of stairs. If each flight of stairs has the same amount of steps, how many steps are in a single flight?

### ENABLING PROMPT

Which shapes can fit together without leaving any gaps or overlapping? (Hint: think about triangles, squares, and hexagons.) Can you try drawing a small section first before drawing the whole side of the building?

Think: If 2,500 steps are spread evenly across 154 flights, how many steps would go on one flight? Could you write it as a division problem to help solve it?

### EXTENDING PROMPT

Can you combine more than one shape in a pattern that still tessellates? How would using a different shape change the look and feel of the building?

What if some flights had more steps than others – how could you work out the average number of steps per flight? Can you estimate the number of steps per flight before calculating and then check if your answer is reasonable?

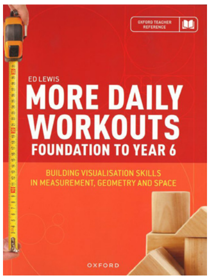
The Prime Number team are always on the lookout for mathematically stimulating images. Contact the editor if you have a photo or a suggestion.
primenumber@mav.vic.edu.au

THE MATHEMATICAL ASSOCIATION OF VICTORIA

# MAVSHOP

WWW.MAV.VIC.EDU.AU/MAV-SHOP

## MAV MEMBERS GET A DISCOUNT ON ALL STOCK




### MORE DAILY WORKOUTS

**F-6**

Measurement and geometry are important skills for everyday living and form an important part of contemporary schooling for all teachers and students. More *Daily Workouts* is an essential and practical resource for teachers, designed to build students' mental imagery skills, develop their learning strategies and support their mathematical understanding. It offers a comprehensive range of activities linked to the Australian Curriculum: Mathematics, Measurement and Space, across all primary year levels (Foundation to Year 6).

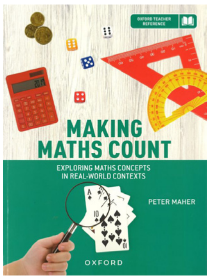
**$80 (MEMBER)**
**$100(NON MEMBER)**


### THE WORLD IS NOT A RECTANGLE

**EY-5**

Learn the story of Zaha Hadid, an Iraqi-born architect, from her childhood in Baghdad to her groundbreaking work in architectural design. The book emphasises how Hadid's unique vision and persistence allowed her to overcome societal and professional obstacles to become a celebrated architect. The book introduces young readers to the concept of architectural design, demonstrating how Hadid's innovative ideas and unique perspectives shaped her buildings.

**$27.90 (MEMBER)**
**$34.90(NON MEMBER)**

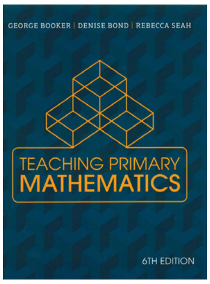



### MAKING MATHS COUNT

**F-6**

As educators, our goal is to prepare students for life beyond the classroom, and therefore the mathematics we teach must be relevant to students' everyday lives. *Making Maths Count* is a practical resource for primary teachers, offering 'low threshold, high ceiling' activities in real-world contexts, with links to the Australian Curriculum: Mathematics. The depth and breadth of these activities support student engagement and motivation, leading to further learning and deeper understanding.

**$80 (MEMBER)**
**$100 (NON MEMBER)**

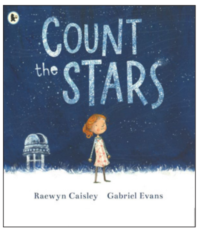



### TEACHING PRIMARY MATHEMATICS 6TH EDITION

**F-6**

The new edition of *Teaching Primary Mathematics* continues to provides undergraduate and post-graduate students opportunities to link mathematical theory to practice and importantly, prepare them for employment.
To help student teachers keep track of the key knowledge and skills they develop as they progress through the chapter, the new edition includes chapter outcomes. The new edition has been updated to improve readability, with more activities, worked examples and visual elements to demonstrate how the theory links to practice. Increased linkages to STEM and the Australian Curriculum are included. A list of activities provides student teachers with a variety of pedagogical activities to implement in their future classrooms.

**$146.95 (MEMBER)**
**$183.70 (NON MEMBER)**




### COUNT THE STARS

**K-1**

This STEM-themed picture book celebrates the love of learning, the magic of mathematics and the joy of finding a kindred spirit. From the parallel lines of moonlight pouring through her bedroom blinds, to counting daisy petals in the garden, Maddie adores maths. If only she had a friend who marvelled at it as she does. Then Dad takes Maddie, along with her classmate Priya, to the observatory where the unfathomable numbers of stars take their breath away.

**$14.40 (MEMBER)**
**$18 (NON MEMBER)**

THE MATHEMATICAL ASSOCIATION OF VICTORIA

**TO ORDER**
**WWW.MAV.VIC.EDU.AU/MAV-SHOP**
**OR CALL +61 3 9380 2399**

*Prices are subject to change.*

# OPTIMISING LEARNING CONDITIONS FOR SELF-DETERMINATION

**Jane Hubbard, Deakin University**

## A GUIDE FOR TEACHERS

Self-determination theory (SDT) (Ryan & Deci, 2017) offers a holistic framework in which students' cognitive achievement and their well-being can be monitored and evaluated simultaneously.

At its core, SDT is centred on the notion that all humans are inherently programmed to have psychological needs to flourish, and that this can be achieved through creating environmental conditions that satisfy one's basic need for autonomy, competence and relatedness (Ryan & Deci, 2017). While the tenets of SDT are applicable to a range to social settings, in an education context SDT positions flourishing as an ongoing and interactive process of development rather than a specific static state to be achieved.

Recognising how SDT's three basic needs are considered to be satisfied from an education perspective helps to highlight how these foundational principles align with both cognitive and affective learning goals in mathematics.

*Autonomy* is associated with a sense of ownership in what is being learned. In contrast to mainstream perceptions of autonomy that centre on complete independence and free will, within SDT, a sense of autonomy can be established by implementing consistent structures that offer choice while also reducing chaos. Importantly, these structures must be enabling rather than rigid and controlling.

Similarly, the definition of *competence* within a SDT framework is different to how it is traditionally perceived in mathematics, centring on a sense of mastery and growth rather than a measure of achievement. Emphasising ongoing development, the classification is deliberately broad to value process over product and enable multiple interpretations of success.

Within this framing, overcoming appropriate levels of challenge, demonstrating independence and making connections to prior knowledge are considered pivotal to learning progression.

*Relatedness* is underpinned by a sense of connectedness and belonging to the learning environment. Initially established by safe and predictable class norms, a sense of relatedness is often further developed through authentic feedback cycles and opportunities to collaborate, where learners feel genuinely seen and valued. Students demonstrating a sense of relatedness are active in the class, working with others and contributing to discussions as opposed to exhibiting passive compliance.

Importantly, these needs are linked to each other via reflexive interconnected relationships that originate through origins of motivation. Essentially this means that being able to initiate a sense of autonomy through a positive motivational condition, such as offering choice, is likely to have a flow on effect where a sense of competence and relatedness are also activated. These connections are dynamic and bilateral: just as conditions can elicit positive motivation to strengthen the pathway for flourishing, they can also manifest negative motivational tendencies, thus reducing students' overall sense of self-determination.

My recent PhD study adopted SDT as the lens to monitor and observe holistic shifts in learning that occurred in Year 2 students as they experienced mathematics through challenging tasks (see Hubbard, 2024).

While SDT has been used as a theoretical lens within mathematics education settings, generally studies have isolated a single component as part of their analysis instead of addressing findings within the interconnected theory. There was no evidence of studies, situated in primary mathematics contexts, that adopted the three basic needs and their motivation origins as a complete analytical framework. Therefore, a key outcome of my PhD was synthesising existing SDT literature to develop a conceptual model that articulates the optimal learning conditions to satisfy students self-determination when learning mathematics. This is known as the Learning Conditions Mandala (LCM) and is presented in Figure 1.

The LCM shown in Figure 1 offers a visual representation of the optimal conditions for learning as reported within research literature associated with positive or negative influences on students' self-determination for learning (i.e., student flourishing). Underpinning the mandala are equal components representing each of the three basic needs of autonomy, competence and relatedness, all converging at a central point to emphasise the notion that when these three needs are perceived by students to be satisfied, they will flourish as learners.

Appreciating the interconnectedness between the three basic needs is critical to recognising, monitoring and evaluating the extent that optimal conditions for learning can be created within a classroom environment. Therefore, included within the LCM is a coding system that connects motivational origins aligned to SDTs associated motivation continuum (Ryan & Deci, 2017).

Categorising the motivational origin in this way supports interpretation of whether basic need satisfaction is occurring and offers clearer insights into what key messages students are internalising about their learning experiences.

For example, students demonstrating fixed mindsets are likely to have origins of motivation stemming from performance orientations and performance pressure, shown to negatively impact on competence satisfaction within the LCM. These students often associate achievement with high performance in tests and equate making mistakes with failure.

# OPTIMISING LEARNING CONDITIONS FOR SELF-DETERMINATION (CONT.)

**Jane Hubbard, Deakin University**

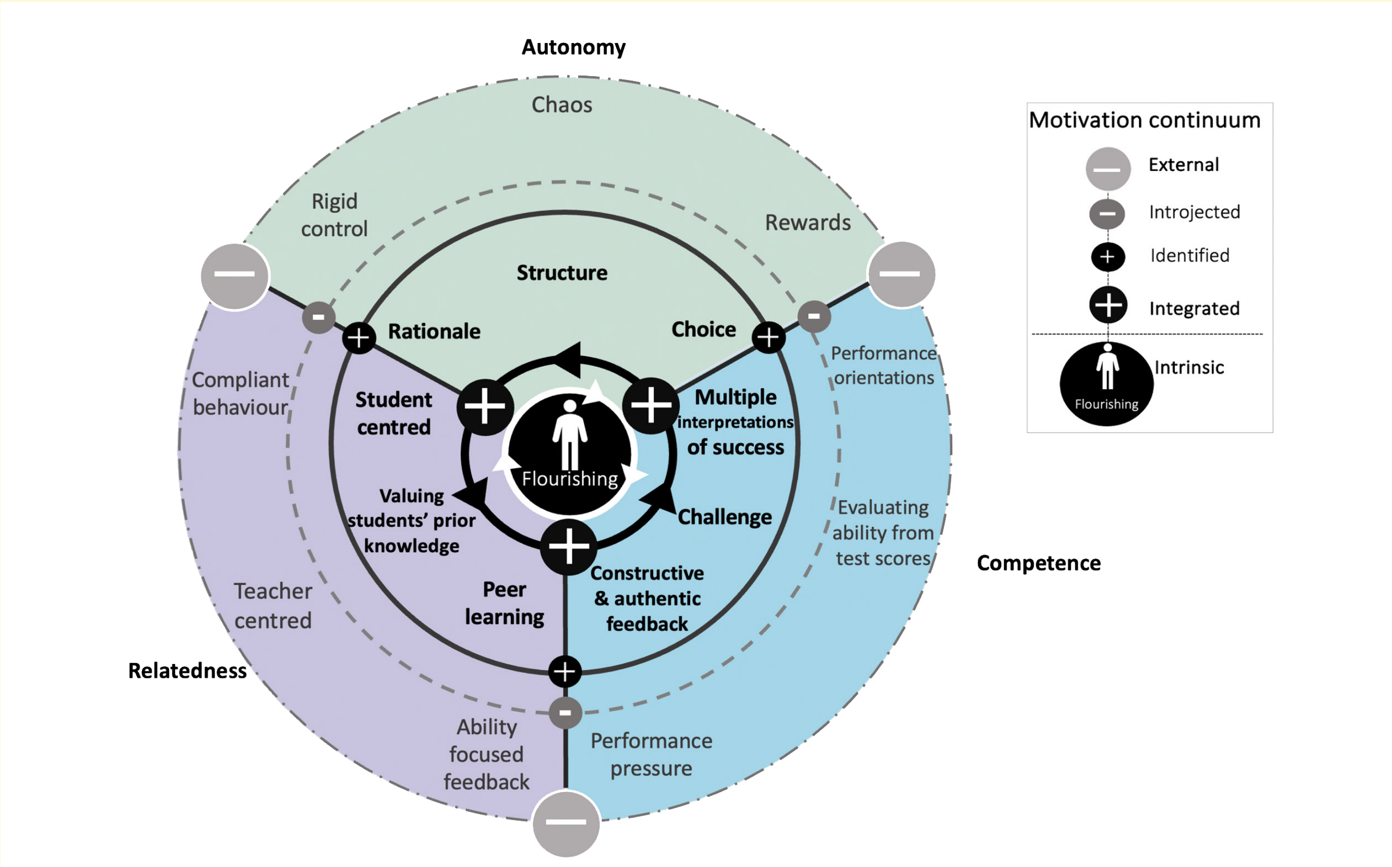



*Figure 1. Learning Conditions Mandala constructed from SDT research.*

Alternatively, students with growth mindsets demonstrate greater tendencies to accept challenge and recognise there are multiple interpretations of success, thus aligning with conditions that are reported to satisfy students' sense of competence.

Identifying the motivation origin in this way has implications for long term learning orientations – once students internalise a particular motivation for learning (e.g., incorrectly associating memorisation with understanding) they can be very difficult to shift.

My PhD findings demonstrated that it is possible to use the LCM to develop nuanced and specific insights about learning progress over time. Filtering a range of data sources (such as written assessments, work samples, classroom observations and student interviews) through the LCM model showed that the pathways students take towards flourishing are unique and multi-faceted.

For some students, their sense of competence stemmed from the initial catalyst of being afforded time to think and make sense of the mathematics' on their own through structures that offered the provision of autonomy. In turn this led to them feeling confident in contributing to class discussions by sharing their thinking, enhancing their sense of relatedness to peers and the learning community.

Other students had to undo negative internalisation before they could progress on the path to flourishing. For example, students who demonstrated anxiety around making mistakes were often reluctant to start tasks without being given explicit direction of what procedure to use.

Ongoing exposure to classroom climates that celebrated mistakes as sense making opportunities and where teachers provided feedback that connected authentically to prior knowledge, helped to synchronise the satisfaction of both relatedness and competence that instigated their progression towards flourishing.

The LCM presented here offers a research-informed tool for teachers to utilise in making deliberate and informed choices for designing mathematics instruction that caters to students of all abilities.

The visual mapping of classroom conditions and their associated motivational origins connects theory with practice, encouraging teachers to move beyond rigid structures and pre-prepared programs towards holistic and responsive instructional approaches.

Using the LCM to monitor, evaluate and reflect on their learning environments provides teachers with constructive and meaningful ways to simultaneously navigate learning progress and sustain engagement whilst prioritising students' overall well-being.

Readers interested in a more detailed account of the LCM can refer to my recently published article in Mathematics Education Research Journal, which is available open access:

Hubbard, J., Russo J., Livy, S., Sullivan, P. (accepted). Optimising learning conditions for self-determination in early years mathematics education, *Mathematics Education Research Journal.*

## REFERENCES

Hubbard, J. (2024). Learning Mathematics Through Sequences of Connected, Cumulative, and Challenging Tasks: A Self-Determination Theory Perspective. In J. Višňovská, E. Ross, & S. Getenet (Eds.), *Surfing the waves of mathematics education. Proceedings of the 46th annual conference of the Mathematics Education Research Group of Australasia* (pp. 279–286). Gold Coast: MERGA.

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development and wellness.* The Guildford Press.

# DIGGING DEEP TO RISE HIGH: ESTIMATIONS AT A BUILDING SITE

John Gough

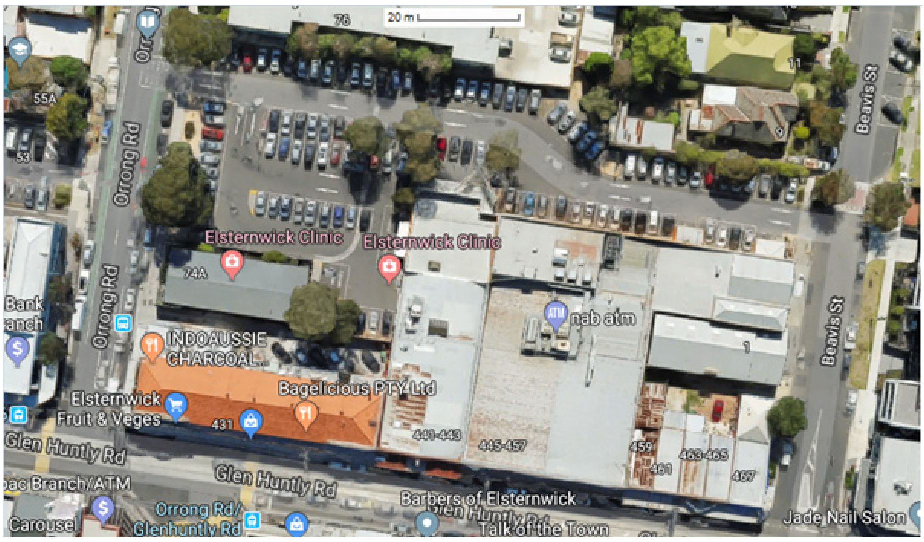



*Figure 1. Birdseye view of the building site. Orrong Road is the on left, Beavis Street is on the right and Glen Huntly Road is at the bottom of the image.*

Near where I live a Coles supermarket that had first been built around 1980 simply disappeared. It became a building site. It re-opened around 2020, just in time for Covid. The following discussion recounts my observations as the supermarket re-emerged from a huge hole in the ground.

When I drove past, I was frequently stopped to let large empty trucks drive into the site, and to let large, filled trucks drive out of the site. Often big gates in the tall screening fence were open and I could see, instead of the old supermarket carpark, a huge, expanding hole in the ground. Before that, enormous auger machines (not pile-drivers) were drilling – very deep – to make a preliminary boundary of tall reinforced concrete columns deep in the ground.

The bird's-eye view of the building site used to be as shown in Figure 1. This article will share a range of prompts you can investigate to get students engaged in mathematical modelling and thinking mathematically about real-world situations that stems from this building site.

## PROMPTING ESTIMATION

With a photo such as in Figure 1, we can estimate distances, and areas, using, for example, an estimated average for the length of a car, as in the car park area in the photo. Some questions to prompt thinking might include:

- How wide is Orrong Road?
- How wide is Beavis Street?
- How wide is Glen Huntly Road (which includes tram lines)?

## SHADOWS

About six storeys were approved for the high-rise block with apartments above the new supermarket. One website mentioned 'The Coles Apartments, 441-445 Glen Huntly Road Elsternwick, 220 unit development, 2 level basement car park, 2 towers of 7 levels plus Coles and minor speciality retail tenancies'. This raises some questions to investigate:

- If a seven-storey apartment block is built along the north-side of Glen Huntly Road, will pedestrians on the south-side of Glen Huntly Road see direct sunlight at noon? On 22 June? On 22 December?
- How much longer is the noon shadow of a multi-storey building for every extra storey the building has?

## CARPARK MEASUREMENTS

The old Coles supermarket car park is easily seen with the cars and the asphalted area between Orrong Road and Beavis Street.

- What do you estimate its area is?
- How many car spaces does it have?
- How could you redesign the old car park area to accommodate more cars?

## SUPERMARKET FLOORSPACE, LAYOUTS AND AREA

The old single-storey supermarket is outlined here (approximately) in green:


*Figure 2. The old single-story supermarket.*

- What is its approximate floor-space?
- Allowing for pedestrian entrances at the northern (upper) and southern (lower) sides of the site, and for a double-bay semi-trailer loading area and storeroom in the smaller section at the upper-right of the photo, how would you lay out a supermarket including typical supermarket aisles or shelving, a fresh fruit and vegetables section, and checkouts?

Figure 3 shows the building site, outlined in red and an estimated area for deep excavations is outlined in yellow. It prompted me to wonder: 'What is the approximate area of the red outlined building site? In square metres? In hectares?'

## CARPARK MATHS

Typically, as with other large modern buildings, the new store includes over 200 undercover car parks. (Other multi-level developments, such as at Malvern Central, Chadstone, and the multi-storey development at the intersection of Dandenong Road and Koornang Road, have multi-level underground car parks. Land is expensive: I know of a high-rise office block in Carlton that has nine floors of underground car parking! This raises the question: what is the percentage increase in car parking space?

## READY TO EXCAVATE!

Planning data for the project said it would involve constructing a new mixed-use development including 173 units, a Coles supermarket, a branch of Liquorland and a three-level basement car park.

Suppose that each basement level needs 3 metres of height (or depth), including the reinforced-concrete parking deck and conduits for air-circulation, electricity, lighting, drainage, and so on:

- How much earth needs to be excavated?
- If an earth-moving truck has a tray and a trailer, each having a capacity of 2m wide × 4m length ×1.5m high, how much earth can a truck carry?
- How many truck-loads will be excavated?
- If it takes an excavator 15 minutes to load an empty earth-moving truck, and excavating and earth-moving occurs between 8am and 6pm, how long will it take to complete the excavation?
- If each of the 173 units have one car-park space, and the supermarket has 200 car park spaces, is a three-level basement car park big enough?

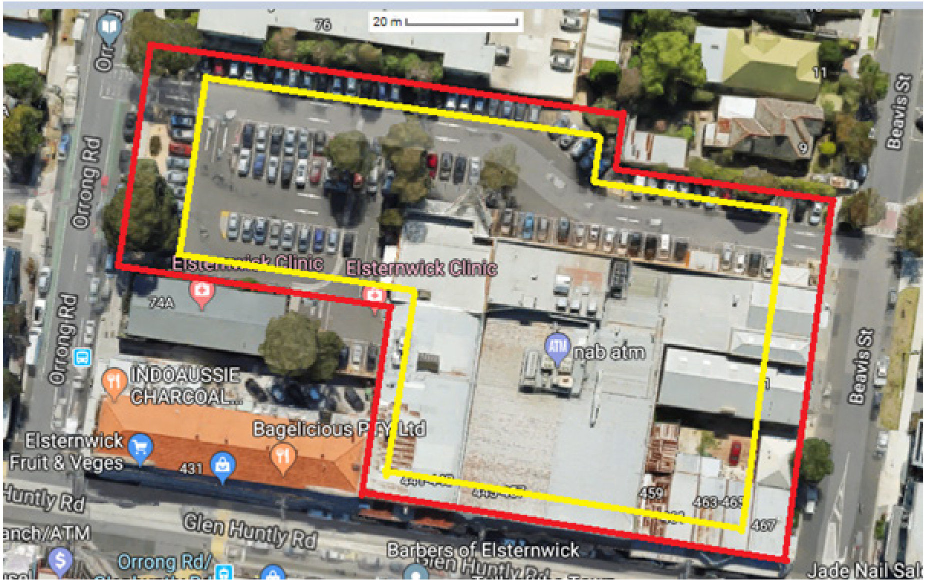



*Figure 3. The building site outlined in red. The estimated area for deep excavations is outlined in yellow.*

## ANOTHER PROPOSED SUPERMARKET

Meanwhile, further west along Glen Huntly Road, Coles' rival, Woolworths, has purchased (for, reportedly, $45 million) a large block of land formerly occupied by ABC TV facilities, the right-hand part of which had, previously, been occupied by a local hardware, building supplies, and timber outlet, Webster's.

*Figure 4. A proposed Woolworths development outlined in yellow.*

- What is the approximate area of this soon-to-be building site?
- What does this cost per square metre?

## STUDENT INVESTIGATIONS

Look for a building site and ask yourself:

- What is being built?
- What used to be on that site?
- What is the area?
- What is the rated value of the land, according to the local council?

Don't just walk past vacant lots, building sites, new developments – think mathematically!

## FURTHER READING

The Coles Redevelopment in Elsternwick discussed in this article: http://merbo.com.au/gallery/Mixed-Use-Developments/Coles-Redevelopment-Elsternwick/20

The Woolworths redevelopment: www.ausfoodnews.com.au/2017/03/15/woolworths-big-melbourne-property-purchase.html

Glen Eira Historical Society to see how the landscape has changed over time: http://home.vicnet.net.au/~gehs/Newsletters/Issue%205.pdf


# Supporting Mathematics

Bring the Victorian Teaching and Learning Model 2.0 (VTLM 2.0) to life in the classroom with trusted, curriculum-aligned resources and tools from the Victorian Department of Education.

### Victorian Lesson Plans

Access ready-to-use learning sequences, lesson plans and retrieval activities — developed by teachers-for-teachers.

### Evidence to Action

Your go-to space for Victorian Teaching and Learning 2.0 guidance, practical strategies, expert insights and professional learning opportunities.

Arc

LESSON PLANS

VICTORIA State Government | Department of Education

# PLAN FOR PLANNING: THE POWER OF MEETING AGENDAS

**Dr Aylie Davidson, Deakin University**

Primary teachers know how valuable collaborative planning time can be, especially in mathematics. It's a chance to design learning experiences and sequences, develop and curate shared teaching resources, discuss assessment, and make sure every student gets what they need. Too often, though, these sessions risk drifting off-track. A conversation about fractions can turn into a chat about an upcoming excursion, and suddenly the hour is gone. A simple meeting agenda can help keep everyone focused and make the time more productive (Davidson, 2018, 2023).

In other words, an agenda is a clear plan for the meeting. In my work, I use an agenda template that I adapted from Boudett and City (2014). The template rests on a simple but powerful idea: professional meetings are learning opportunities for adults, just as lessons are for children. For that learning to happen, meetings need the same thoughtful design we give our classroom teaching – clear preparation, shared facilitation guidelines, and a structure that shows the time is valued. When we plan the meeting with care and collaborate on it, the meeting itself becomes a model of the respectful, focused work we want for our students.

The agenda doesn't need to be complicated, but it does need a few key parts to keep the conversations on track and are summarised in Table 1. The template also contains a discussion column to record what was discussed.

When teachers regularly use an agenda, planning sessions feel less rushed and more productive. Ideas are shared, decisions are made and everyone leaves knowing exactly what happens next. Students benefit from better-aligned teaching, and the team feels supported. For example, one teacher reflected:

*'Planning is now becoming a little bit more like planned in itself ... having an agenda . . . let's utilise this time and get as much work done as we can.'*
– Year 1 team leader.

| AGENDA ITEM | PURPOSE |
|---|---|
| Meeting objectives | When everyone knows exactly what the meeting is for, it's easier to stay on topic. For example, instead of writing 'Discuss upcoming shape unit'. Write 'To identify and discuss key skills, important ideas, vocabulary, and helpful models for upcoming shape unit'. |
| Roles | List roles so the work is shared fairly: one person facilitates, another keeps time, and someone takes notes. Rotating these roles means no one feels stuck with the same job every week, and quieter team members often shine when they have a clear task and everyone contributes. |
| Preparation | Ask for preparation ahead of time. A line as simple as 'Please bring three examples of student work from the *Four Cube Houses* task' means teachers arrive ready to discuss real evidence instead of guessing what might be happening in classrooms. The agenda could also request teachers to skim and scan the required reading prior so they come prepared to discuss it. |
| Materials | Note the materials needed e.g., the required reading, pattern blocks to design a possible assessment task, or hyperlinking to the shared online planning folder such as Teams. Listing and linking them saves the frantic search five minutes into the meeting. |
| Time schedule | A realistic breakdown of start times, topics and who is leading keeps the meeting moving. Note, while two meetings are never the same depending on where the team is at in a unit of work. However, for a 60 minute meeting, you might allow for:<br>• 5 minutes – Quick check-in<br>• 15 minutes – Examining recent student data (formal and/or informal)<br>• 25 minutes – Plan upcoming learning experiences<br>• 10 minutes – Decide on resources to try<br>• 5 minutes – Agree on follow-up actions |
| Follow-up actions | Ending with follow-up items (who will do what and by when) gives the meeting a sense of closure and keeps the momentum going until the next session. |

*Table 1. Elements and purpose of the agenda template.*

So, while our collaborative planning time is limited, a clear, shared agenda, respects that reality. It keeps the focus on what matters most, moves the conversation forward, and helps every minute count. When we walk out of the room with decisions made and next steps agreed, we know the time was used well. That small investment in planning the meeting itself gives us better lessons, stronger teamwork, and more ideally, and clearer direction for our individual planning and for meeting the needs of every student. Please email if you would like a copy of the template.

## REFERENCES

For a list of references, contact primenumber@mav.vic.edu.au.

# NUMERACY LEADER'S CORNER:
## EMMA DOYLE

### I AM

Emma Doyle. I'm a Leading Teacher at Wooranna Park Primary School. We have just over 260 students and a high percentage of EAL/D students. We are proud of our community, catering for a wide range of social, economic and cultural backgrounds.

### MY ROLE

I have been a Leading Teacher for almost eleven years and have worked in different school settings over the years. I have been in this role since the start of 2025. My main responsibility is to lead a whole school vision for high quality teaching practice through instructional coaching, classroom modelling and whole school curriculum planning. I work closely alongside PLCs to plan and sequence learning across the school.

### MY JOURNEY

I began my journey as a Numeracy Leader almost eleven years ago in a large school setting and now work in a smaller school. Over the years, I have gained experience teaching in every year level, including pre-school and specialist subjects. I have always had a keen interest in the teaching of mathematics and in making evidence informed decisions to ensure high levels of student engagement and participation.

### I'M WORKING ON

I am working on building collective depth and understanding of the VTLM 2.0. This includes focusing on embedding an inclusive classroom environment that enables the learning of all students and provides access for all to high quality Core Instruction at Tier 1. This work is centred around curating, adapting and delivering a Guaranteed Viable Curriculum with resources that are readily available. High student engagement and participation in mathematics is always a focus.


### THE BIGGEST CHALLENGE

The most challenging part of my role is placing emphasis on the compelling vision that maths can be a universal language while providing access to Tier 1 Instruction for all learners.

Language is only a barrier to maths if we let it be one.

### THE BEST PART

The best part of being a Numeracy Leader is working with educators and students to provide high quality maths lessons and help them find their love of maths and learning. One of my favourite parts of the job is building belief and capability in others to deliver high quality learning experiences for students. We are only one small step away from embracing our love of maths!

### BEST NUMERACY RESOURCE

Some of my best resources are *Teaching Primary Mathematics* by George Booker, Denise Bond, Len Sparrow and Paul Swan. I also enjoy referring back to *My Word Book: Mathematics* by Dr Paul Swan and David Dunstan. Whenever I have a moment of doubt about the best way to communicate and deliver content that is clear and concise, I always refer back to these resources.

### BEST BIT OF ADVICE

A piece of advice to leaders is that connection and engagement to staff and students is key in a school, especially when leading whole school student improvement in numeracy.

# MATHS IN THE WORKPLACE: FASHION BUYER

Bianca Burd

## MY JOB...

My background is in fashion buying, and although people often think the fashion industry is all glamour, only a small part of it is truly creative. Most of the work is grounded in numerical analysis; understanding historical sales data, identifying what sold (and what didn't) and using those insights to influence future product decisions.

Today, I am the Commercial Manager for a rapidly growing fashion accessories brand. My motto is 'if it makes cents, it makes sense.' My current role combines the responsibilities of a Head of Merchandise and Logistics Manager, meaning I oversee what product is being bought, how much to buy, where to put it, and how to move it around the business efficiently.

## MY WORK IS ALL MATHS...

I have three computer screens so I can analyse multiple spreadsheets at once!

### WHAT TO BUY

Every day my team reviews sales data to decide what to keep buying and what to phase out. Some of the key mathematical techniques I rely on include:

- Trend and sales analysis: Calculating year-on-year (YoY) growth, sell-through rates and sales contribution percentages by category or style to identify top performers.
- GMROI (Gross Margin Return on Investment): Measuring which products deliver the highest profit per dollar invested in stock.

These methods turn raw numbers into actionable insights: helping ensure we invest in products that resonate with customers and deliver strong returns.

### HOW MUCH TO BUY

Buying the right amount is directly linked to profitability, and maths forms the foundation of these decisions. For example, we consider:

- Demand forecasting: Using averages, moving averages, seasonal indices and weighted forecasts based on past sales and future trends.
- Margin and markdown modelling: Testing how price elasticity affects sell-through and profit.

These calculations help to maintain healthy cash flow and ensures we're buying to demand, not to excess.

### BEST PLACE TO PUT IT

The final step is ensuring customers can access what they want, when and where they want it. With more than 60 stores across three countries, this is a delicate balancing act and maths plays a vital role in getting it right. For example:

- Store grading and clustering: Using data averages (e.g. sales per square metre, conversion rates) to group stores by performance.
- Space productivity ratios: sales per square metre and profit per facing.

These metrics help plan visual merchandising and range depth.

- Allocation algorithms: Calculating initial and replenishment quantities per store based on sales patterns and predicted demand.
- Performance benchmarking: Comparing stores and online channels using indexing (e.g. store index = store sales ÷ average store sales × 100).
- Optimisation modelling: Balancing sell-through and sell-out to reduce markdowns and improve yield.

Maths underpins all these decisions, ensuring stock is placed where it will sell fastest and most profitably.

## AT SCHOOL...

At school I was fairly indifferent to maths – it wasn't a subject I loved. I took VCE Maths Methods because it was a prerequisite for studying business and economics, which turned out to be a great decision.

## AS AN ADULT...

As an adult, I've come to really appreciate maths, especially with the support of technology. I love being able to take a curiosity about store or product performance and use data to explain its success (or failure!). Maths frustrates me far less now that I don't have to do everything mentally and for repetitive queries I can build Excel models to find answers instantly.

## MATHS ENABLES MY PASSION...

I'm fascinated by how artificial intelligence will further streamline my use of maths in the future. To use AI effectively, I believe you still need to understand the mathematical principles behind the analysis but I see huge potential for it to help me triangulate insights faster and reveal blind spots I might otherwise miss.

THE MATHEMATICAL ASSOCIATION OF VICTORIA

# INVESTIGATIONS

Michaela Epstein, Maths Teacher Circles, mathsteachercircles.org/MAVPrimeNumber

## GUESS MY NUMBER

Easy to adapt, *Guess My Number* is a great game for reinforcing skills and vocabulary in place value and number.


### HOW IT WORKS

Introduce students to *Guess My Number*:

- One player chooses a secret number between 0 and 120.
- The other players ask up to eight Yes/No questions to work out the secret number.
- Each question uses at least one mathematical term.

The goal? To work out the secret number.

Share a relevant word list for students to use in the game. For example: ones, tens, hundreds, greater than, less than, between, place value, digits.

Run one or two demonstration games, so that everyone can see the game in action. For example:

- 'Does the number have two digits?' 'Yes' (It must be between 10 and 99)
- 'Is it greater than 55?' 'Yes' (It must be between 56 and 99)
- Etc.

Mention to students that each round of the game is an opportunity to learn from the last. As they play, they will find that some questions are more helpful than others. Also, some questions are better at the start, while others help more towards the end.

Some students will be tempted to keep asking the same type of question, e.g. 'Is it between…?'. If they are ready for it, pose an extra challenge: to not ask the same type of question more than once in a round.

Wrap up by sharing strategies, observations and remaining questions. This is a great game to keep coming back to.

### GO FURTHER

*Guess My Number* is a great game to keep coming back to. Here are variations you could use instead. These will help students take their skills, strategies and thinking ever further:

- Change the number line, e.g. from 550 to 1050, 19,990 to 20,500, 0 to 5, 2 to 3, etc.
- Use and number chart instead of a number line
- Change the number of questions that can be asked
- Asking students for variations is also a wonderful approach!

### WHY USE IT?

*Guess My Number* gives learners valuable practice in:

- Comparing quantities.
- Estimation and benchmarking numbers.
- Identifying the place value and other properties of numbers.
- Identifying and testing strategies.
- Using mathematical vocabulary.

### VC:M 2.0 LINKS

Level 1: VC2M1N01, Level 2: VC2M2N01,
Level 3: VC2M3N02, Level 4: VC2M4N04,
Level 5: VC2M5N01 and VC2M5N03,
Level 6: VC2M6N01 and VC2M6N03.

Scan the QR code to get 10 free problems for building deep understanding and strategy in maths.

What kinds of investigations have you used in your classroom as a launch for mathematical exploration?
Our readers would love to hear your experiences. You can share your ideas with us at primenumber@mav.vic.edu.au.