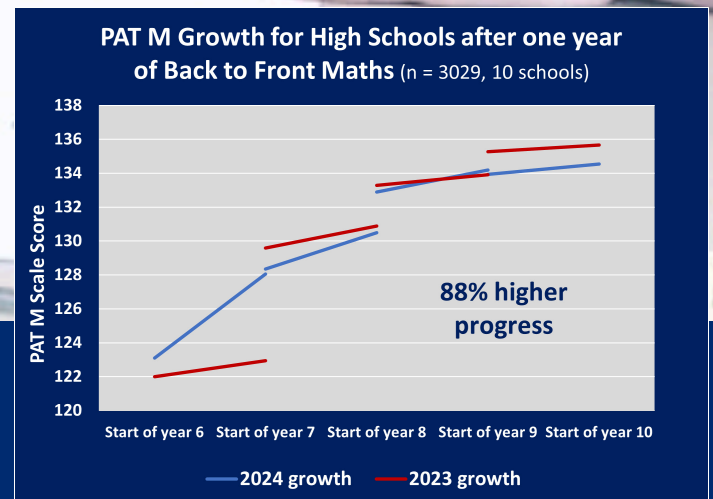
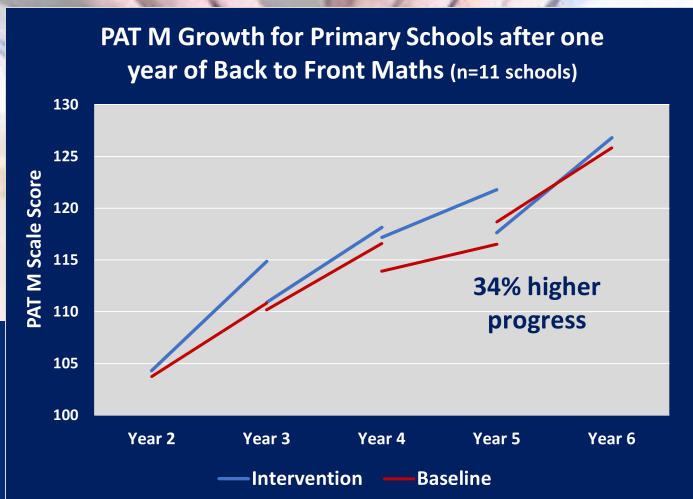


UNLOCKING POTENTIAL, TRANSFORMING UNDERSTANDING

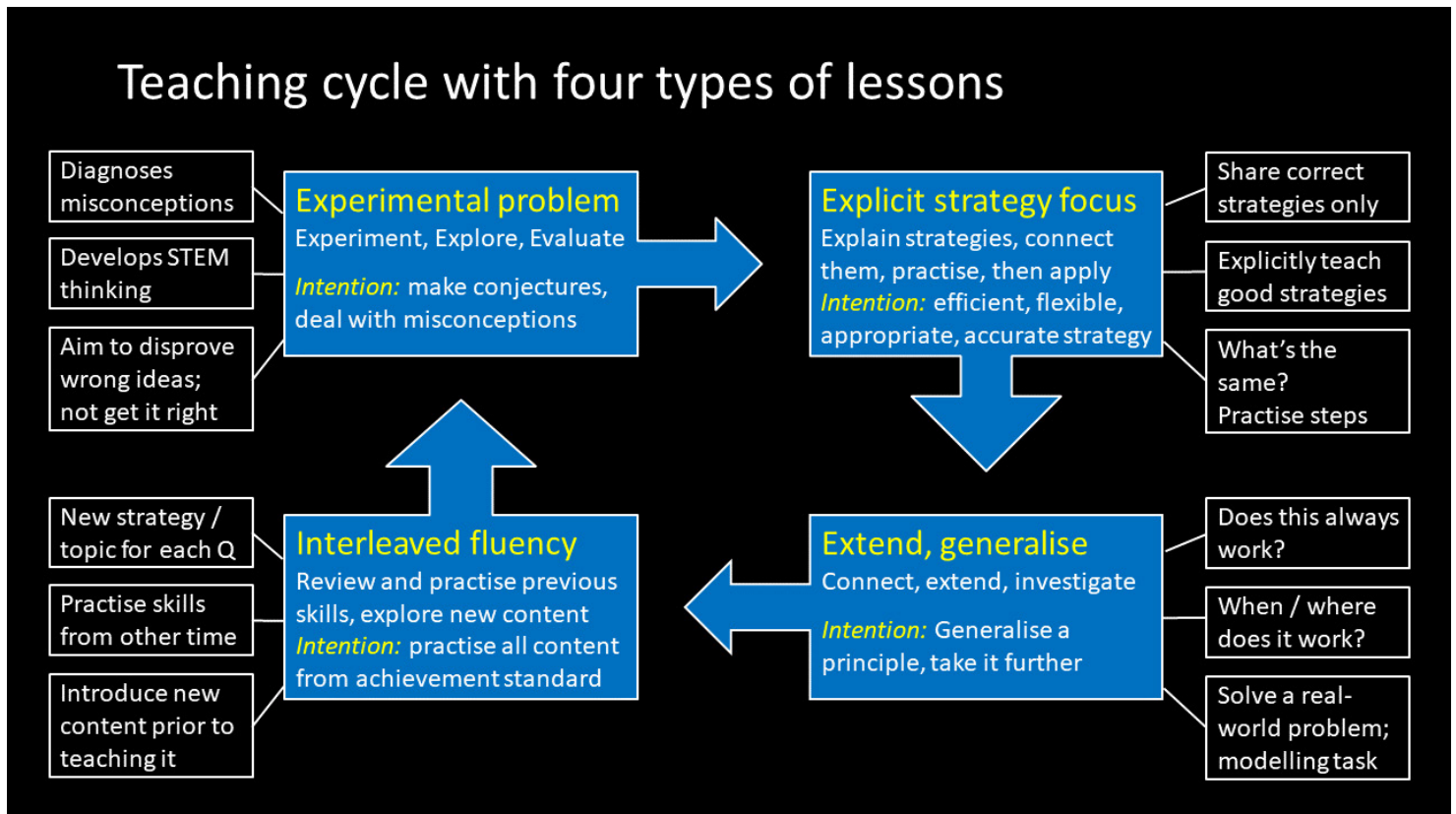
Practical resources with *real* results

BY TIERNEY KENNEDY



Why it works

Back to Front Maths is a balanced teaching approach formed by combining multiple high-impact strategies, rather than simply a set of resources. It is this combination of strategies, underpinned by our unique developmental sequence, that results in such reliably high students gains.



We start by **experimenting** with unfamiliar concepts to develop new ideas. This process also guides the teacher to uncover **misconceptions**, addressing them with our conceptual-change questioning process. Students make and test conjectures, exploring new ideas and connecting them with more familiar maths.

Next, learning is formalised into mathematical **principles**, including algorithms and formulae. Principles are extended, transferred and generalised to other areas of the curriculum, linking concepts by way of **flexible strategies**. Retention is built through spaced **retrieval**.

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What teachers love

Teachers are supported with a flexible work-program that helps build connections between areas of maths, lesson plans that include detailed questioning, and differentiation across multiple year levels, and videos showing content along with flexible strategies. Assessment criteria sheets and moderation tasks provide strong guidance for reporting.

Sequential Lesson plans with Printable Tasks

Printable activities with adaptable lesson plans include experimental problems for introducing new concepts through problem-solving and addressing misconceptions, as well as Blast activities for using questioning to build the deep understanding necessary to develop mathematically. Lesson plans follow a simple structure and include questioning, differentiation, further suggestions and tips.

Assessment Matrices and Moderation Tasks

A range of criteria sheets, assessment schedules and explanations are provided in both teacher and parent-friendly language. Criteria for F-8 and 11-12 Essential Maths embed both the content and proficiency requirements from the Achievement Standard.

Moderation tasks for problem solving, reasoning and understanding provide a point for calibrating for overall judgement.

Year 1	Well above standard (A)	Above standard (B)	At standard (C)	Not yet at standard (D or below)
Proficiency strand	Choose appropriate and flexible strategies, procedures and representations. Apply strategies efficiently and with a high degree of accuracy. Answer robustly. Manipulate objects, expressions or relations when representing more complex mathematics.	Choose appropriate strategies, procedures and representations. Apply strategies accurately and with some thought for efficiency. Use objects, expressions and relations flexibly to represent mathematics.	Choose and apply learned strategies appropriately. Use objects, expressions and relations appropriately to represent mathematics. Connect understanding to learned strategies.	Follow steps for some suggested strategies, with support provided as needed. Attempt to represent mathematics using objects, drawings or expressions.
Problem Solving	Mathematically represent complex practical situations, or problems for which the way forward is not obvious. Plan multiple steps for solving the problem. Carry out plan, adapting and combining strategies as necessary and checking for errors along the way. Check to see if solutions fit the context and communicate them clearly.	Represent multistep problems and practical situations mathematically. Make a plan to solve them. Select and apply a combination of strategies or operations to solve problems with multiple steps. Check for errors. Communicate solutions clearly.	Represent routine problems and familiar, practical situations mathematically. Select from and apply rehearsed strategies to solve problems. Communicate solutions.	Support provided to interpret familiar, practical situations and work out what strategies to use. State answers to some simple, familiar problems.
Reasoning	Interpret and model unfamiliar and complex, practical situations. Make conjectures and experiment with ideas. Analyse findings, including mathematical commonalities and differences, and identify patterns. Develop complex strategies and transfer to seemingly unrelated situations. Evaluate findings and prove or disprove conjectures. Clearly explain or demonstrate processes.	Interpret practical situations and work out how to model them with mathematics, including familiar situations with some complexity. Analyse mathematical commonalities and differences to identify patterns. Adapt strategies to suit complex situations. Clearly explain or demonstrate processes used, including adaptations. Evaluate the usefulness of strategies.	Interpret familiar, practical situations and model them with mathematics (including deciding what operations to use and writing number sentences). Compare and contrast ideas, looking for and identify patterns. Explain process or demonstrate working. Reflect on the usefulness of strategies chosen.	Support provided to identify patterns, similarities or differences in practical situations. Provides partial explanation of steps.
Understanding	Cultivate new ideas by transferring related ideas, concepts and strategies to new contexts. Represent and interpret connections between related concepts in multiple ways, demonstrating relationships.	Develop some new ideas by connecting related ideas, concepts and strategies. Represent and interpret concepts in multiple ways, demonstrating relationships.	Connect related ideas, concepts and strategies. Represent concepts in different ways, demonstrating thinking about relationships.	Support provided to connect related ideas, concepts and strategies, or to represent concepts mathematically.

Numbers to 120

Before you begin:

To play the *Tens and Ones* game, see below. Make sure for this activity that each student ends up with a number between 50 and 60 so that when they join with a partner they will have 100-120. You will also need MAB (ones, tens and hundreds) for this activity.

Tens and Ones Game:

To play the *Tens and Ones* game, each student will need a copy of a place value chart, some dice and bundling sticks. Alternatively, use MAB instead of bundling sticks.

- Students work with a partner and share a pile of bundling sticks, rubber bands and a die. They take turns to roll the die and add the number of sticks that corresponds to the number on the die to their chart.
- Students should bundle the sticks into groups often as they are able and place the bundles in the tens column.
- The game should be timed to see how many sticks they collect within a short time frame.
- Students should make sure they have made as many bundles of ten as possible and work out how many sticks they have using the tens and ones on their chart. Encourage them to work out as many ways of writing or representing their number as they can think of.

Leading questions:

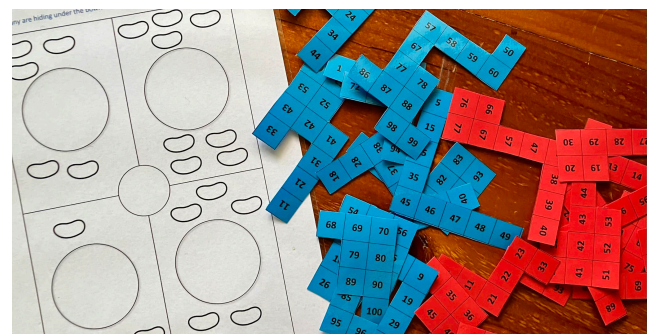
- How many bundles of ten do you have? How many ones do you have?
- What is the problem with this?
- What number has tens and ones?
- Can you draw a picture to show your number?
- Can you find your number on the chart on the page?
- Try organising your bundling sticks in a different way (e.g. change the number of tens by undoing one or more of your bundles and putting them with the ones.)
- Now how many tens and ones do you have?
- What would your number look like if it was written in words?
- How could you make your number using MAB? Let's

Watch out for:

- Students who reverse the digits.
- Students who do not understand regrouping of two digit numbers, or who have difficulty with tens and ones concepts.
- Students who write 100 at the front, then the remaining number after (e.g. 127 would be written as 10027).
- Students who think after 109 comes 200.

Investigations, student-friendly extension tasks and printable games

Our investigations and extension tasks are designed to cover concepts from across at least three year levels. Our games are easy to learn, engaging to play and build fluency across a range of topics.



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BACK TO FRONT MATHS



What leaders love

Not only does Back to Front Maths work, it works exceptionally well and reliably. Every year we collect and publish data on PAT M and NAPLAN results from schools working in projects with us. Peer-reviewed research papers show the results of Back to Front Maths on school results.

Developmental work program

- Content aligns week-to-week across all year levels from Foundation to Year 6
- Every 5th week is kept free for flexible teaching
- 3 content lessons + 1 interleaved retrieval lesson + 1 flexible lesson each week
- Flexible strategies link number concepts to non-number concepts each term
- Investigations, extension tasks and modelling are built in to the program for easy access

Developmental sequence for content

Term 1	Term 2	Term 3	Term 4
Revise place value	Arrays: multiplication and structural thinking	Place value at year-level standard	Algebraic thinking and patterning, Cartesian plane
Add and subtract + number lines	Big kids: Prime, composite, odd, even, Area	Fractions at year-level standard	Order of operations
Integers	Little kids: place value, add + subtract		Money and modelling
Number-line concepts: Length Mass + Capacity Map scales or directions Time for older kids	Arrays: Division Revise fractions Clocks, angles (both are turns and link with fractions) Directions or shape/objects	Data investigation Big kids: Probability Little kids: collect data on shapes/objects and classify them	Big kids: Tricky geometry Little kids: place value at A/B levels

Professional learning that is practical, enjoyable and accessible

Our professional learning is approved by both the South Australian and Western Australian education departments. We work in partnership with mathematical associations, clusters, schools and Catholic Education to provide targeted in-person and online professional learning to meets the needs of teachers.

Professional learning videos

Back to Front Maths provides over 40 hours of recorded professional learning videos. We have short videos to answer quick questions, more in-depth videos for content and we even answer commonly asked tricky questions.



What principals say

"Just wanting to share a recommendation for anyone looking for support in improving numeracy outcomes in their school. Our school has been working with Tierney Kennedy for the last few years and have had some great success in building capacity in our teachers to effectively achieve the stretch for their students in numeracy. This was well worth the money and time invested. This year is the first year we will be working without Tierney holding our hands so we are a bit nervous, but confident in our plans forward. Tierney makes you let go when she thinks you're ready."

Leanne Lovett, SA Principal 2024

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