

# UNLOCKING POTENTIAL, TRANSFORMING UNDERSTANDING

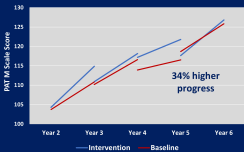
Practical resources with *real* results

WITH TIERNEY KENNEDY

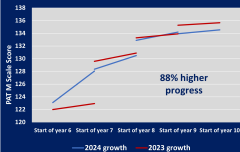
**BACK TO FRONT  
MATHS** 



PAT M Growth for Primary Schools after one year of Back to Front Maths (n=11 schools)



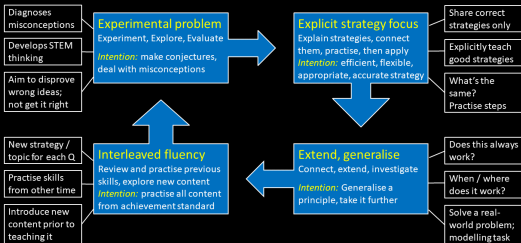
PAT M Growth for High Schools after one year of Back to Front Maths (n = 3029, 10 schools)



# 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.

## Teaching cycle with four types of lessons



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 collaborating for overall judgement.

Proficiency level	Not clear (standard 1)	Some (standard 2)	Good (standard 3)	Not all of (standard 4)
Fluency	Shows appropriate skills/abilities, procedures, algorithms and representations. Demonstrates efficiency with a high degree of accuracy. Minor omissions. Minor errors in representing non-numeric and non-numeric.	Shows appropriate strategies, procedures and representations. Applies strategies accurately and with some thought to efficiency. Minor omissions, minor errors and relations. Fluently represents mathematics.	Shows and explains related strategies, procedures, algorithms, representations and relations. Mathematics is correct.	Shows and explains related strategies, procedures, algorithms, representations and relations. Mathematics is correct.
Problem Solving	Mathematically represent problem and practice procedures, algorithms for the problem. Shows some understanding of the problem. Shows some understanding of the problem. Shows some understanding of the problem. Shows some understanding of the problem.	Mathematically represent problem and practice procedures, algorithms for the problem. Shows some understanding of the problem. Shows some understanding of the problem. Shows some understanding of the problem.	Mathematically represent problem and practice procedures, algorithms for the problem. Shows some understanding of the problem. Shows some understanding of the problem. Shows some understanding of the problem.	Mathematically represent problem and practice procedures, algorithms for the problem. Shows some understanding of the problem. Shows some understanding of the problem. Shows some understanding of the problem.
Reasoning	Interprets and makes appropriate and accurate, logical inferences. Makes connections and explains with some logical reasoning. Shows some understanding of the problem. Shows some understanding of the problem. Shows some understanding of the problem.	Interprets practical situations and uses logical inferences. Makes connections and explains with some logical reasoning. Shows some understanding of the problem. Shows some understanding of the problem. Shows some understanding of the problem.	Interprets practical situations and uses logical inferences. Makes connections and explains with some logical reasoning. Shows some understanding of the problem. Shows some understanding of the problem. Shows some understanding of the problem.	Interprets practical situations and uses logical inferences. Makes connections and explains with some logical reasoning. Shows some understanding of the problem. Shows some understanding of the problem. Shows some understanding of the problem.
Understanding	Communicates concepts by describing related ideas, concepts and strategies in some ways. Represents and interprets connections, relationships and strategies in multiple ways. Demonstrates understanding.	Communicates concepts by describing related ideas, concepts and strategies. Represents and interprets connections, relationships and strategies. Demonstrates understanding.	Communicates concepts by describing related ideas, concepts and strategies. Represents and interprets connections, relationships and strategies. Demonstrates understanding.	Communicates concepts by describing related ideas, concepts and strategies. Represents and interprets connections, relationships and strategies. Demonstrates understanding.

## Numbers to 120

### Before you begin:

To play the Tens and Ones game, you'll need: Make sure for this activity that each student ends up with a number between 50 and 100 so that when they join with a partner they will have 100-120. You will also need MAD (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 bonding sticks. Alternatively, use 100-rod instead of bonding sticks.

- Students work with a partner and share a pile of bonding 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 when they are able and place the bundles in the tens column.
- The game should be played to see how many sticks they collect before a 100-rod form.
- 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 in their chart. Encourage them to work out as many ways of writing or representing their number as they can think of.

### Leading questions:

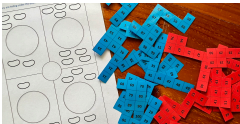
- How many bundles of ten do you have? How many ones do you have?
- What is the number with 100?
- What number has ... tens and ... ones?
- Can you draw a picture to show your number?
- Can you find your number on the chart on the page?
- By exchanging your bonding sticks in a different way (e.g. change the number of tens by unbundling one or more of your bundles and putting them with the ones), how many more tens and ones do you have?
- What would your number look like if it was ten less or ten more?
- How could you make your number using MAD? Let's

### Watch out for:

- Students who misread the digits.
- Students who do not understand representing two-digit numbers, or who have difficulty with tens and ones concepts.
- Students who write 100 at the front, then the remaining number after a + 123 would be written as 20371.
- Students who think after 100 comes 090.

## 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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# 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
Review place value	Arrays: multiplication and structural thinking <b>Big kids:</b> Prime, composite, odd, even, Area <b>Little kids:</b> place value, add + subtract	Place value at year-level standard	Algebraic thinking and patterning, Cartesian plane
Add and subtract + number lines		Fractions at year-level standard	Order of operations, Money and modelling
Integers			
<b>Number-line concepts:</b> Length Mass + Capacity Map scales or directions Time for older kids	<b>Arrays:</b> Division Reverse fractions Clocks, angles (both are turns and link with fractions) Directions or shops/ objects	Data investigation <b>Big kids:</b> Probability <b>Little kids:</b> collect (data on shapes/ objects) and classify them	<b>Big kids:</b> Tricky geometry <b>Little kids:</b> place value of 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, partnerships, schools and Catholic Education to provide targeted in-person and online professional learning to meet 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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