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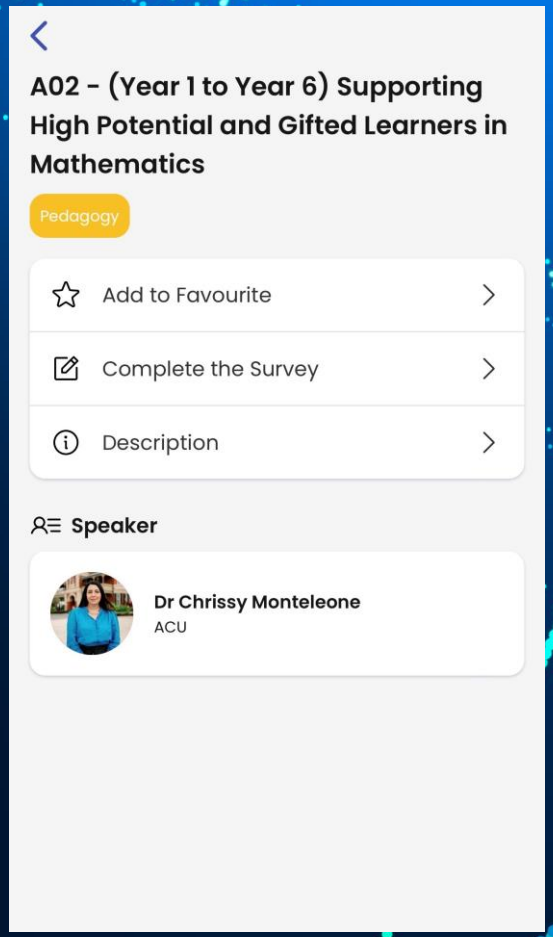
Be in it to WIN!



CURRICULUM, PEDAGOGY AND BEYOND

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A Whole School Fluency Program WHY, WHAT and HOW

Zahra Harvey and Adam Wight
Lysterfield Primary School

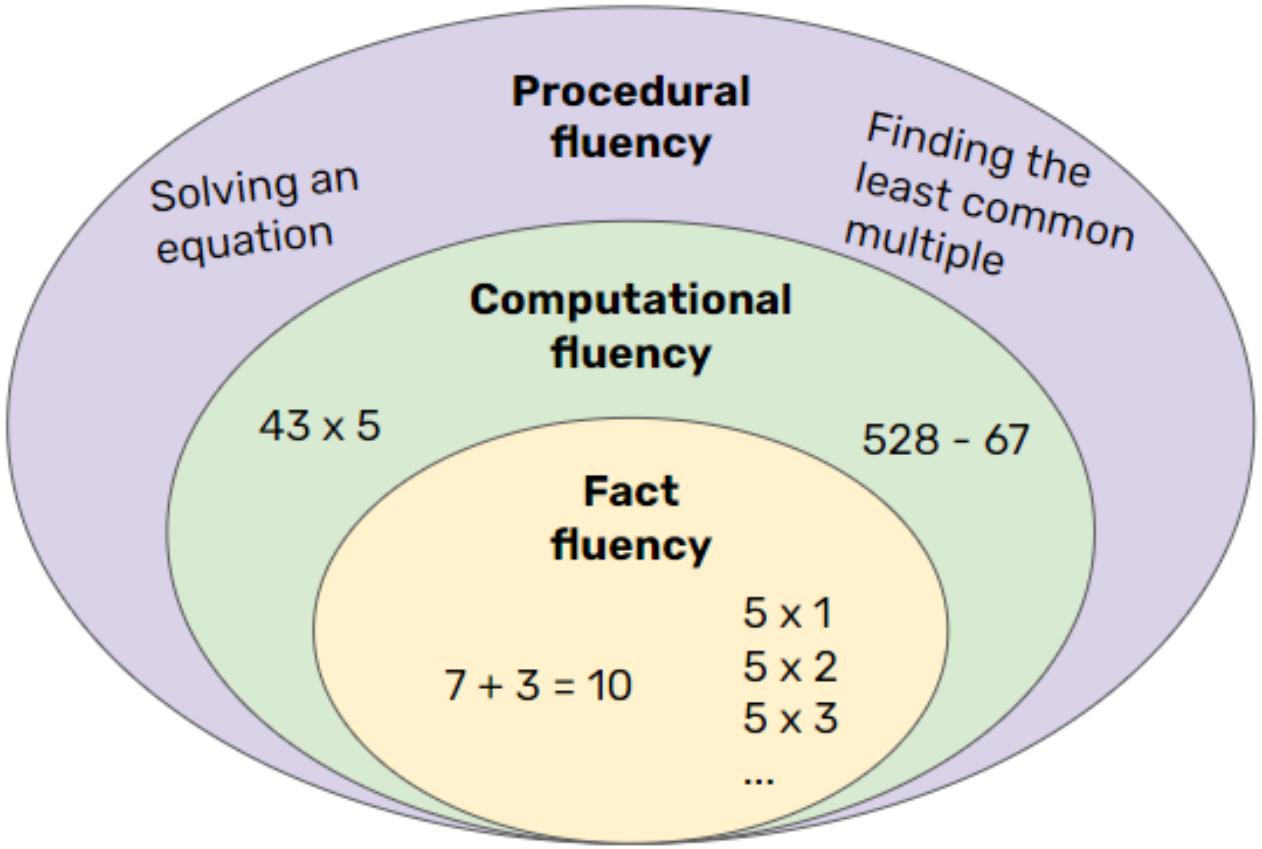
Focus for the Session

- The Background – The Why
- The Program – The What
- The Implementation – The How
- Maintenance
- Troubleshooting
- Features of a quality fluency program
- Existing fluency program options
- Questions

The Background – The Why

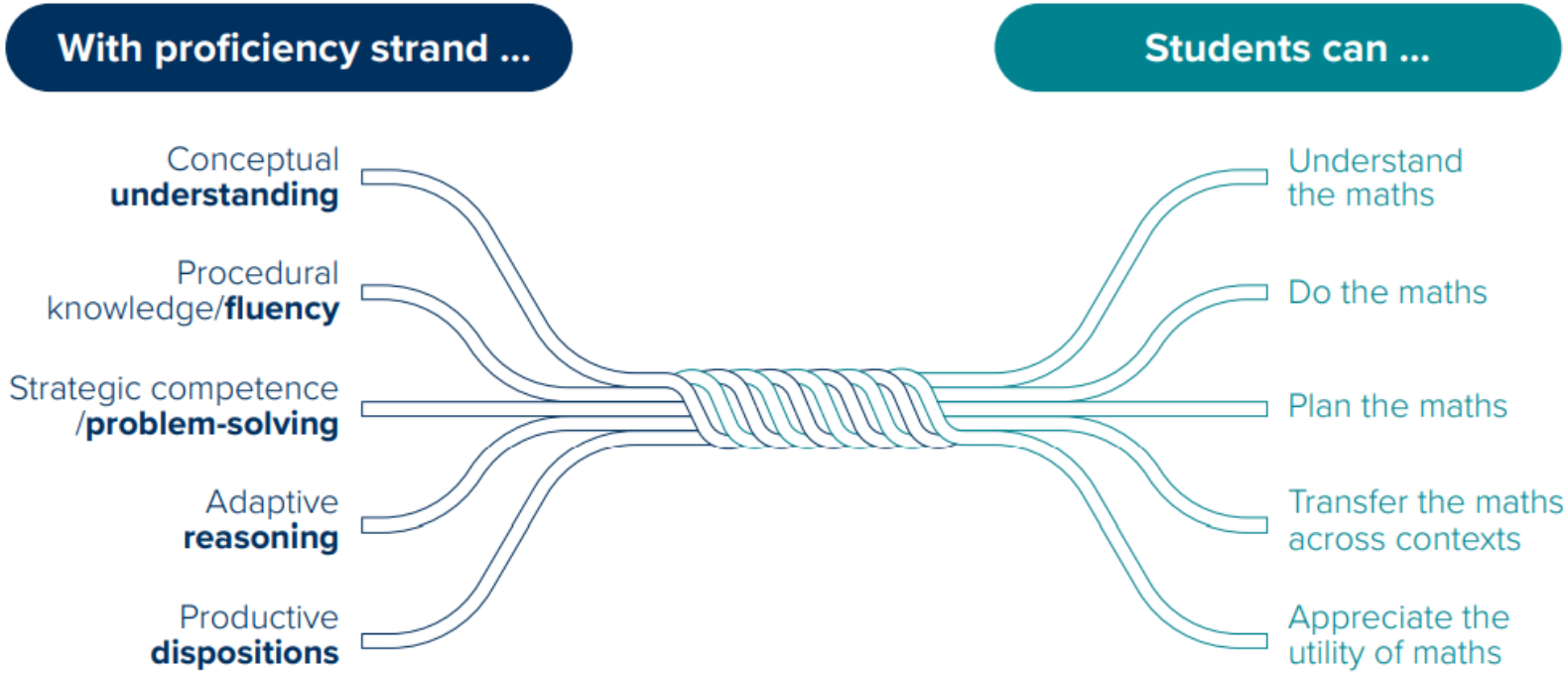
- What do we mean by fluency?
- Why is fluency important?
- What we were doing for fluency at LPS
- The impetus to change

What do we mean by fluency?



Graphic Source: [Innovamat]

Why is fluency important?



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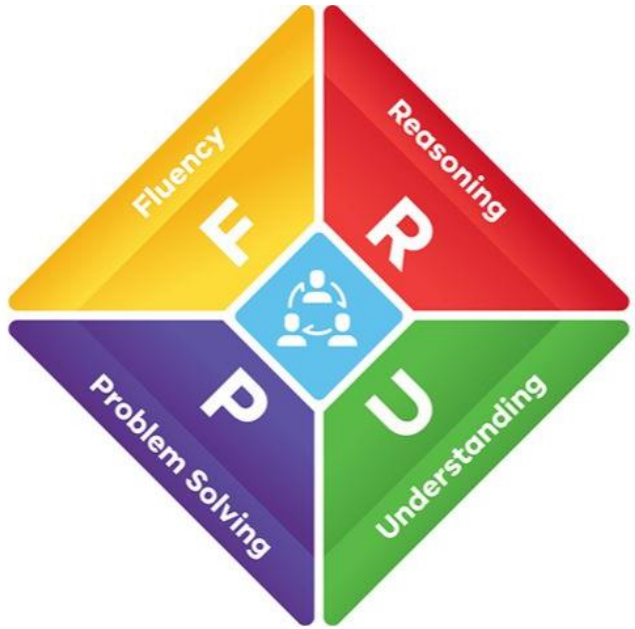

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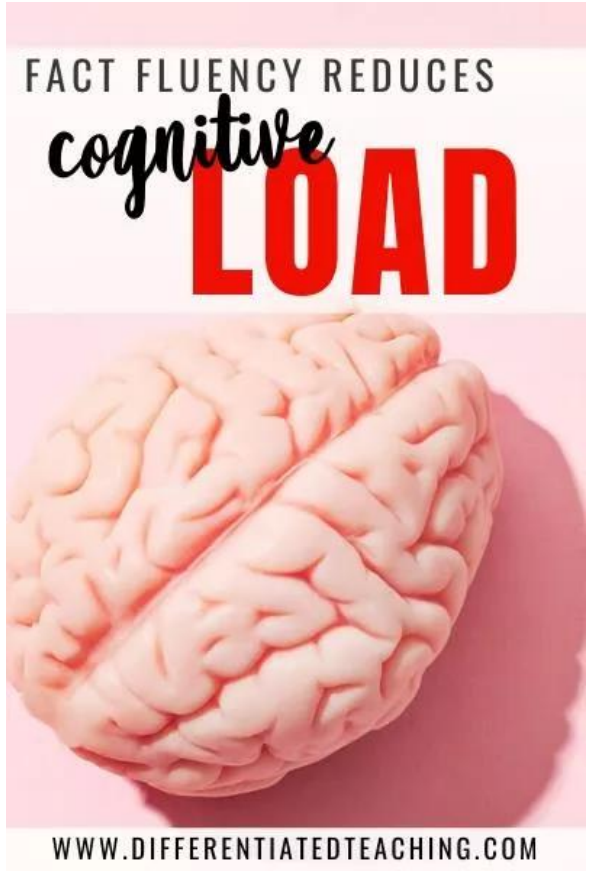
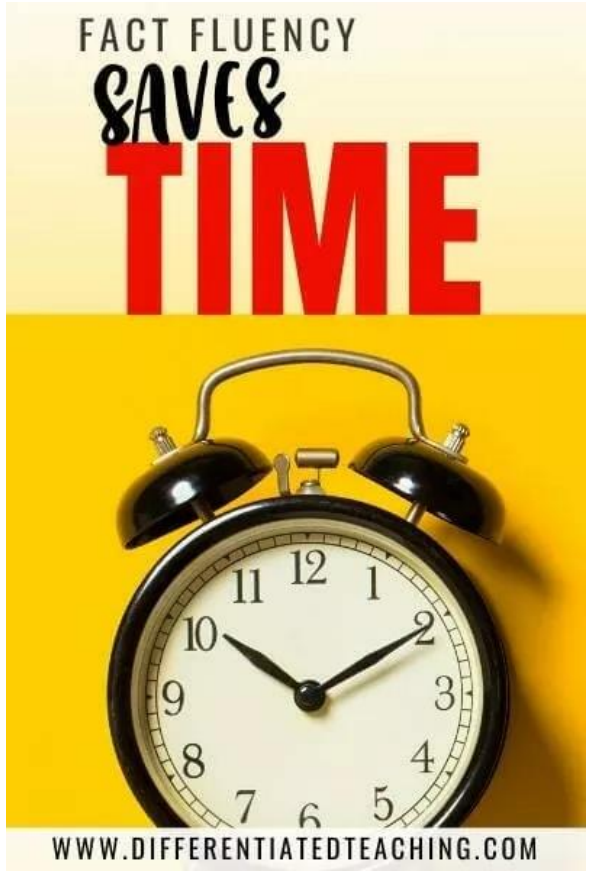
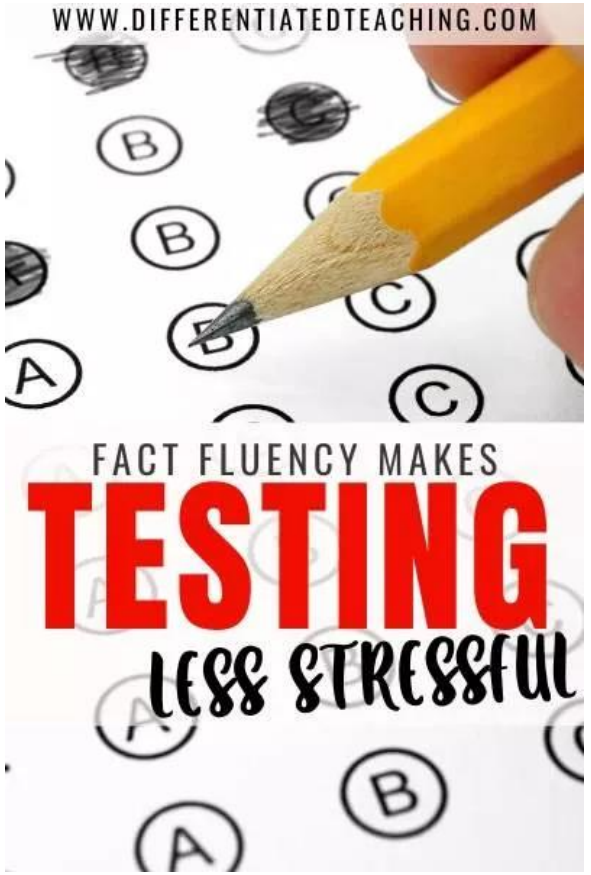
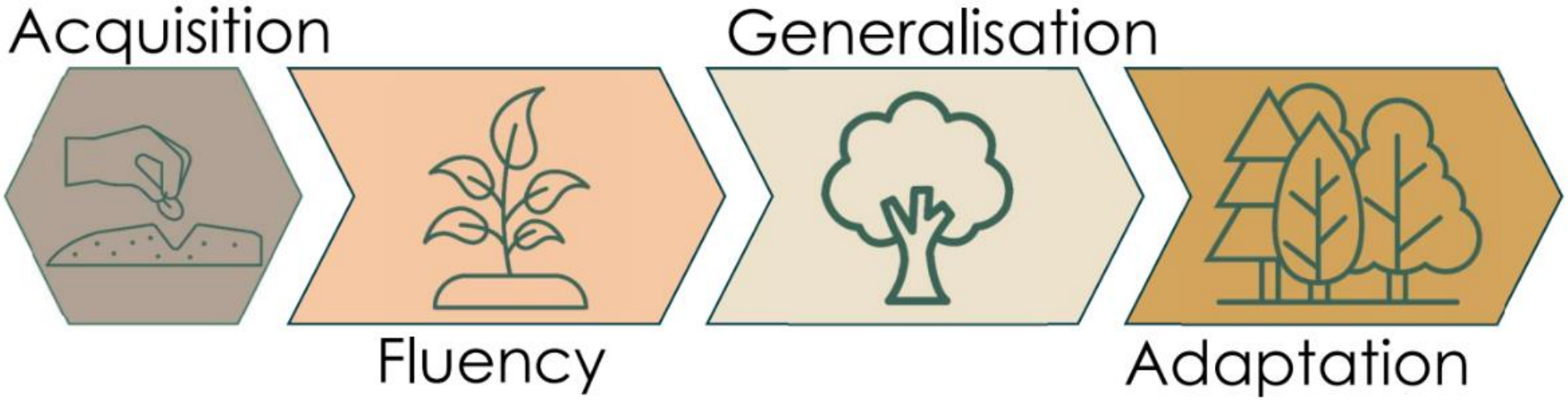






Why is fluency important?

Instructional Hierarchy – Stages of Learning



- Fluency → access to higher parts of the hierarchy
- High level school maths → more likely to get into and graduate from university and earn more income as an adult

Info Source: Sarah Powell, 2022

What we were doing at LPS

- Games linked to lessons taught
- Fluency practise once a week
- No assessment of fluency
- Not focused on mastery
- Not focused on a sequence of progression

The impetus to change

Top 2 band students in 2021 (%)

For students in **Year 3**, **Numeracy**

Your school	Similar schools	Network	State
38%	48%	49%	41%

Top 2 band students in 2021 (%)

For students in **Year 5**, **Numeracy**

Your school	Similar schools	Network	State
29%	35%	39%	33%

Students above benchmark growth in 2021 (%)

For students in **Year 5**, **Numeracy**

Your school	Similar schools	Network	State
8%	20%	20%	22%

The impetus to change

Question	Student A	Student B
14 - 7	Written algorithm	Automatic *because double 7 is 14*
16 + 3	Counts on from 16	Automatic *because 6+3=9*
14 + 8	Written algorithm	Automatic *8+4=12 then add 20*
17 - 8	Counts backwards using fingers	Automatic *I took away 7 then 1*
13 x 6	Lattice written method	Fluent *10 x 6 then 3 x 6 and add together*
63 ÷ 7	Written algorithm and written skip counting	Skip count by 7s

The Program – The What

- The origins of Maths Masters
- The mathematics content of Maths Masters
- The classroom program
- Celebrating and promoting achievement

The origins of Maths Masters

Pakenham Consolidated School

Growing and learning together

OFFICER PRIMARY SCHOOL

HOME OUR SCHOOL WHAT'S ON CURRICULUM FOUNDATION 2023 PARENTS & FRIENDS CONTACT

MATHS RANGERS.

The Maths Rangers program will be taught as part of the Numeracy Curriculum at Officer Primary School. The students work through the program starting with the Yellow Ranger Belt, Green Ranger Belt, and Pink Ranger Belt and finally completing the Black Ranger Belt.

Each of the belts relate to the key skills required for students to have a sound knowledge of Number skills. Students will also work on completing the Red Ranger Belt (Time) and Blue Ranger Belt (Money and Financial Maths). Once students successfully gain their coloured belt, they will receive wristbands that correlate to that

Home Resources EPS Story

Maths Masters

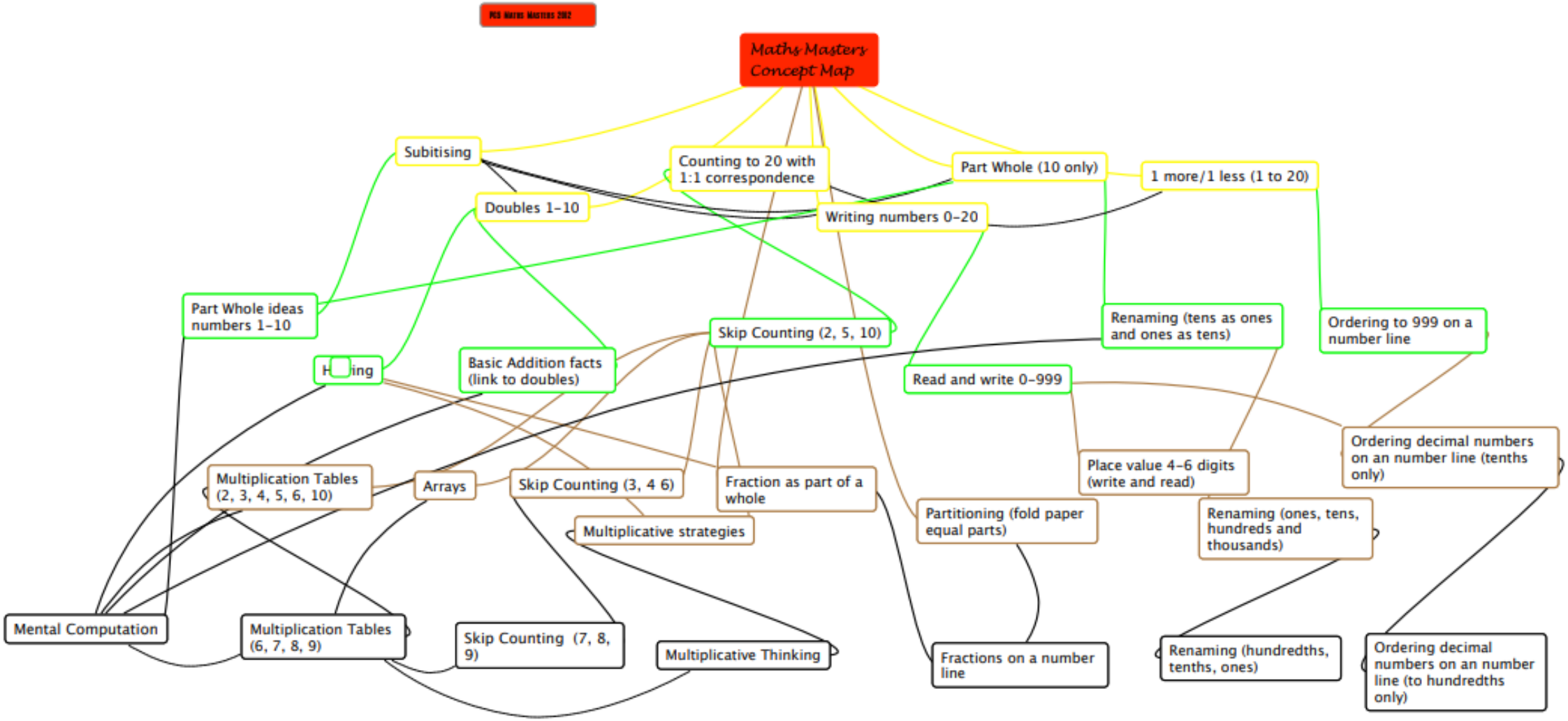
Mighty Mathematics Learning Rangers

Tooradin Primary School

Contact Us

HOME OUR SCHOOL TEACHING AND LEARNING PARENT INFORMATION OSHC AND VACATION CARE MORE...

The content of Maths Masters



The content of LPS Maths Masters

- Based on Di Siemon's Big Ideas in Number
- 63 discrete skills across 9 different coloured belts
- Connected and interconnected skills focused on key foundational skills necessary for success in primary (and later) mathematics
- Mastery and application of pre-requisite skills for skills in later belts (fact fluency → computational fluency)
- Mastery and application of Maths Masters skills needed for 'procedural fluency'

The content of LPS Maths Masters

BELT ORDER:

White

Yellow

Orange

Red

Green

Blue

Purple

Brown

Black

Whole Number Thinking	Additive Thinking	Multiplicative Thinking	Fractional Thinking
Counting objects 0-20	Part - part - total 0-10	Count by 2 / 5 / 10	Name fraction
Subitising	Friends of 10	Arrays	Create fraction
Counting forwards and backwards from any number 0-20	Doubles	Count by 3 / 4 / 6	Count forwards and backwards in fractions
More/less Before/after 0-20	Halving	Times tables 2 / 5 / 10	Compare fractions (benchmarks)
Reading and Writing 0-20	Make 10	Times tables 3 / 4 / 6	Order fractions
PV - teen numbers	Near doubles	Multiplication Master 0-10	Rename fractions
Compare and order 0-20	Adding numbers 0-20	Count by 7 / 8 / 9	Compare decimals
Counting forwards in 1s and 10s from any number 0-99	Subtracting numbers 0-20	Times tables 7 / 8 / 9	Order decimals
Counting backwards in 1s and 10s from any number 0-99	Estimation of 3 digit addition	Addition, subtraction, multiplication mental master	Count forwards and backwards in decimals
PV - Renaming 0-99	Estimation of 3 digit subtractions	Division facts	PV - rename decimals
Reading and Writing 0-999	Add and subtract integers -20 to 20	Multiplication Master 0-99	Connect fractions, decimals and percentages
Compare and order 0-999		Multiply and divide by 10, 100 and 1000	Solve % of problems

Reading and Writing 0-9999		Apply knowledge of divisibility tests	
Counting forwards in 1s, 10s, 100s and 1000s from any number 0-9999		Square numbers 1-10	
Counting backwards in 1s, 10s and 100s from any number 0-9999		Estimation of 1-2 digit multiplication	
Compare and order 0-9999		Estimation of division	
PV - Renaming 0-999			
Counting forwards in 1s, 10s, 100s, 1000s and 10000s from any number 0-999,999			
Counting backwards in 1s, 10s, 100s, 1000s and 10000s from any number 0-999,999			
Reading and Writing 0-999,999			
Compare and order 0-999,999			
PV - Renaming 0-999,999			
Compare integers			
Order integers			

The content of LPS Maths Masters

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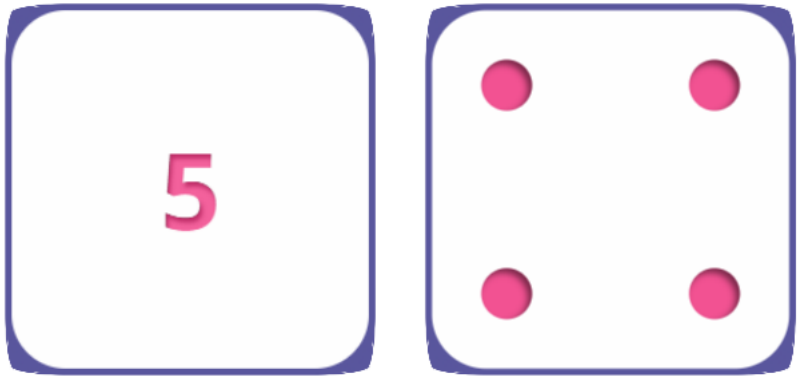
Reading and Writing 0-999	Add and subtract integers -20 to 20	Multiplication Master 0-99	Connect fractions, decimals and percentages
Compare and order 0-999		Multiply and divide by 10, 100 and 1000	Solve % of problems

Applying content of LPS Maths Masters

- Reading numbers / number before and after



- Times tables / multiplying by powers of 10

	2	7	9
x			3

Program Resources

WHITE BELT	W1 - Counting Master	W2 - Subitising Master	W3 - Back and Forward Master	W4 - Number Neighbours Master	W5 - Reading and Writing Master	W6 - Part-part-total Master	W7 - Friends of 10 Master
Skill	I can accurately count a group of objects up to 20	I can recognise a number of objects, up to 6, with no counting (or ten on a tens frame)	I can count forwards or backwards (0-20) from any starting number	I can say the number before and after, or 1 more and 1 less than numbers 0-20	I can read and write numbers 0-20 accurately and in order	I can say the smaller parts of numbers 0-10 e.g. 8 is 4 and 4 5 and 3 etc.	I can say the pairs of numbers that equal 10
Useful materials	counters	dice subitising cards (1-3) and (4-6) filled five frames filled ten frames dominoes	number lines 0-20 cards	number lines dice 0-20 cards	number lines 0-20 cards	tens frames counters double sided counters unifix 0-10 cards	dice filled tens frames counters 0-10 cards
Practise Ideas	Fill a cup with counters. Spill and count. Place counters in a line. Count. Place counters in a circle. Count.	Match different materials with the same value Cards/Frames - flip and say Dice - roll and say	Flip a card. Count forwards from that number. Flip a card. Count backwards from that number. Flip 2 cards. Count forwards from the smaller to bigger, or backwards from the bigger to smaller.	Roll dice or flip card. Say the number after or 1 more. Roll dice or flip card. Say the number before or 1 less. Cover some numbers on a number line. What number is missing?	Flip a card. Say number. Order cards. Trace over numbers Write numbers in order Write missing numbers on a number line	Make a number on tens frames in 2 colours in different ways Make unifix towers of the same number using 2 colours in different ways Shake and spill double sided counters. Say the two parts of that number based on the colours.	Roll dice. Say number that would equal 10. E.g. Roll 4, say 6. 10 Snap/Go Fish - when 2 cards equal 10, it's snap / a pair Flip a filled tens frame. How many? How many more to ten? E.g. flip 4. Say 4 and 6 more to 10
Online Resources	Teddy Numbers Counting Fish Candies in a Jar	Subitising Seeds How many? Koala Karts	Missing Numbers Whack A Mole Balloon Pop	Bee More or Less Rainbow Juice Numbers to 20	Number Bingo (10-20) Today's Number Apple Picking	Shake and Spill Addition Triangle Numskill	Make Ten Sum of Ten Ten Frame Equation

Program Resources

- Assessments for teachers →
- Student friendly goal practise sheets ↓

W1 – Counting Master

I can accurately count a group of objects up to 20.

To practise this skill, I can:

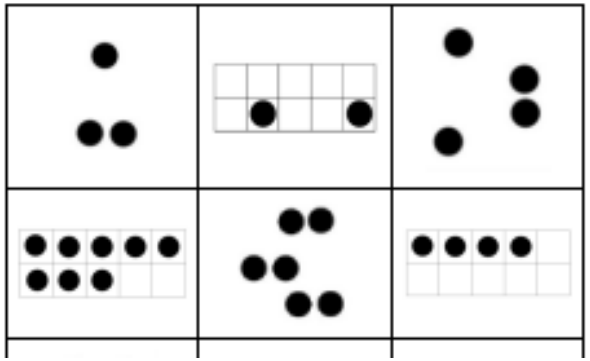
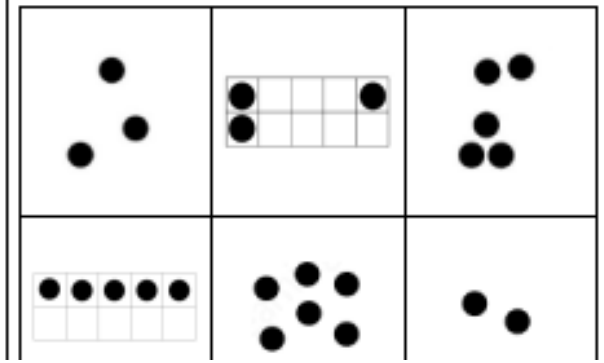
Fill a cup with counters and then spill them out and count.	Grab some counters and put them in a line. Count them.	Grab some counters and place them in a circle. Count them.
		

WHITE BELT ASSESSMENTS

WHITE BELT
W1 - Counting Master

Test A	Test B
Give student 3 containers with counters in them. The containers should have 6, 13 and 20 counters. Student needs to correctly count the counters using 1:1 correspondence.	*Give student 3 containers with counters in them. The containers should have 7, 12 and 19 counters. Student needs to correctly count the counters using 1:1 correspondence.*

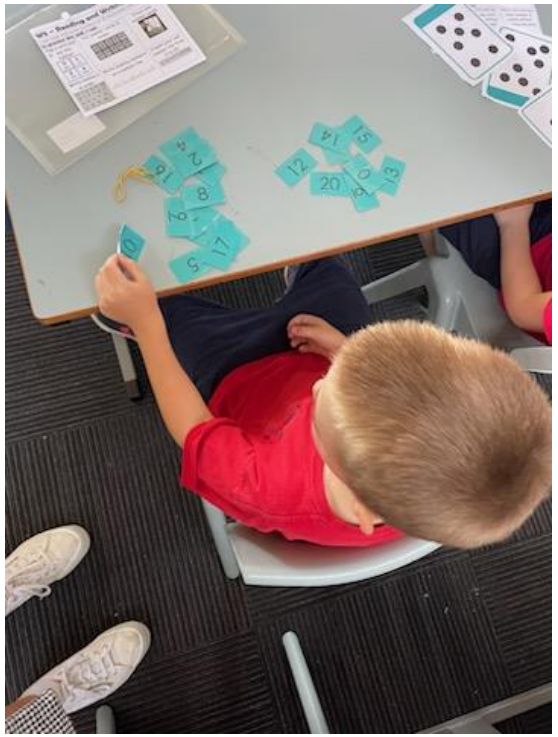
WHITE BELT
W2 - Subitising Master

Test A	Test B
How many dots? Link to larger picture (on page 1) *Student must answer quickly without counting individual dots.*	How many dots? Link to larger picture (on page 2) *Student must answer quickly without counting individual dots.*
	

The classroom program

- All students assessed to find ‘goal’ at point of need
- Students taught how to practise their goal, given required resources, and expectations of mastery (oral / mental / <3 sec response)
- Students practise their goal 3-4 times a week for 5-15 minutes (depending on the year level)
- Teachers assess / conference students during practise time
- Home / school connection

The classroom program



Celebrating and promoting achievement

MATHS MASTERS - WHITE BELT

- ◯ I can accurately count a group of objects up to 20
- ◯ I can recognise a number of objects, up to 6, with no counting (or ten on a tens frame)
- ◯ I can count forwards or backwards (0-20) from any starting number
- ◯ I can say the number before and after, or 1 more and 1 less than numbers 0-20
- ◯ I can read and write numbers 0-20 accurately and in order
- ◯ I can say the smaller parts of numbers 0-10
- ◯ I can say the pairs of numbers that equal 10

You are a white belt master!

Signed _____

Date _____

You are an **LPS MATHS MASTER**

Congratulations

~

☑ WHITE BELT ☑ YELLOW BELT ☑ ORANGE BELT ☑ RED BELT ☑ GREEN BELT
☑ BLUE BELT ☑ PURPLE BELT ☑ BROWN BELT ☑ BLACK BELT

_____ Adam Wight—Principal

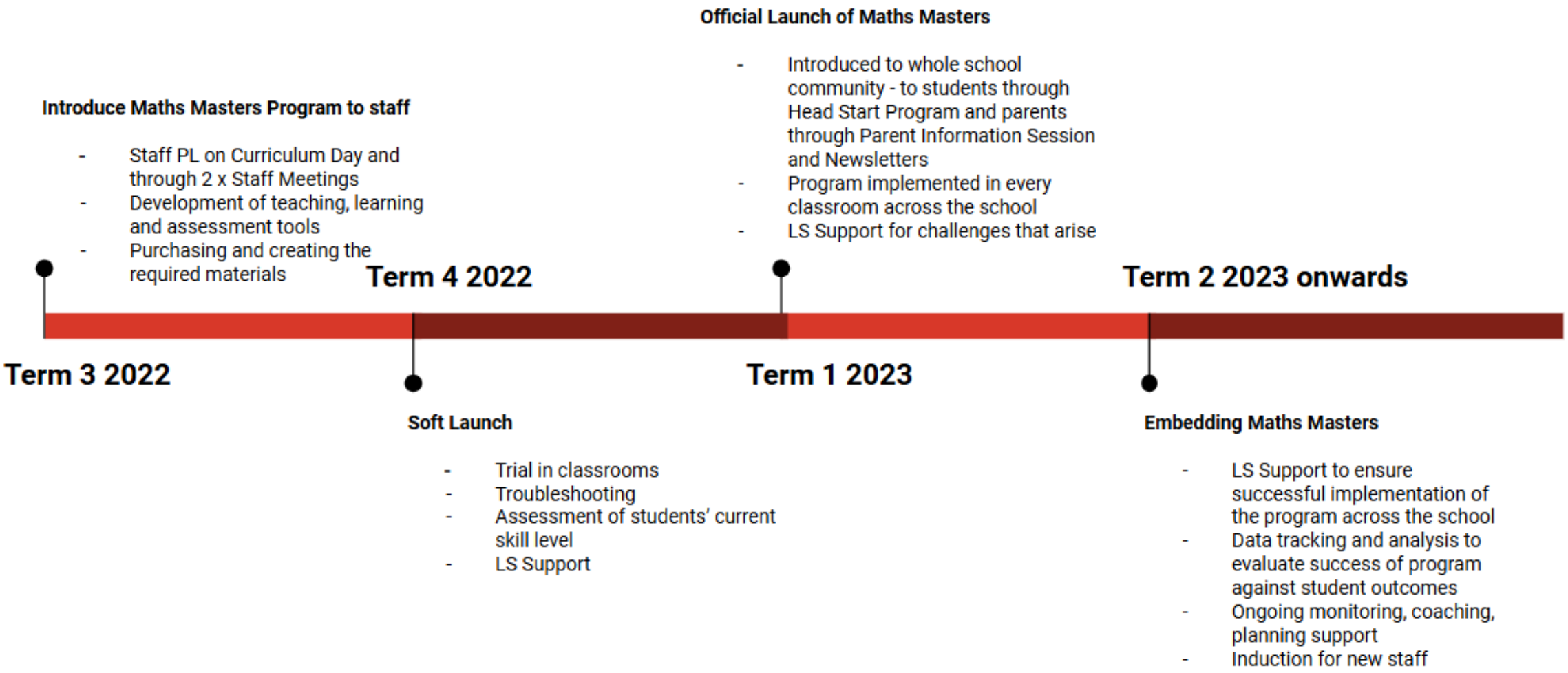
_____ Date

Celebrating and promoting achievement

The Implementation – The How

- Timeline of implementation
- Change management
- Teacher launch
- Student and community launch

Timeline of Implementation



Managing the change implementation

- Leveraging previous / existing work and expertise
  - Big Ideas
  - Learning Specialist
- Increasing teacher capacity and commitment
  - Professional learning
  - Program development
  - Assessment launch

  } time
- Community Launch
  - Students through Head Start
  - Parents through Information Session, Assembly and Newsletters

Maintenance

- Ongoing Professional Development
- Modelling and Observations
- Instructional Playbook – next slide
- Data / Progress tracking

Progression: Maths Masters | Everyone | Export CSV | Pop Out

Descriptor	Emma	Adele	Ruby-May	Wade	Roman	Kaylee	Dilara	Dusty	Mila	Chase	Chloe	Aarav	Asher	Mavis	Mckennah	Abigail	Annabelle	Kobe
1. White Belt	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full
2. Yellow Belt	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full
3. Orange Belt	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Full	Partial	Full
4. Red Belt	Full	Full	Partial	Full	Full	Full	Partial	Full		Full	Full	Full	Full	Full	Full	Partial		Full
5. Green Belt	Partial	Full		Full	Full	Partial		Partial		Partial	Partial	Full	Partial	Full	Full			Partial
6. Blue Belt		Full		Full	Partial							Full		Partial	Partial			
7. Purple Belt		Full		Partial								Partial						
8. Brown Belt																		
9. Black Belt																		

Instructional Playbook

In a sentence

Maths Masters is a whole school fluency program where students practise discrete, developmentally sequenced number skills linked to the Big Ideas in Number until they achieve mental fluency and mastery.

What's the point?

Developing fluency with foundational maths skills increases capacity and cognitive load for students to attend to more complex problem solving. Maths Masters provides students with a vehicle to drive their own learning - they know what their goal is and can become motivated to learn and achieve their next 'belt'.

What to do

1. Identify the starting point for each student in the class (either through Compass Continuum from the previous year or assessing from White Belt for any new/prep students).
2. Teach/communicate each students' goal to them, and the way/s they can practise their goal.
3. Establish clear routines and expectations for practising (volume, don't interrupt teacher, stay on task, independent or partner practise). **DO NOT PRACTISE MATHS MASTERS ONLINE**
4. Provide students with resources (time and materials) to practise their goal at least 3 times a week for approximately 10 minutes depending on the year level (no less than 5 mins, no longer than 15 mins).
5. While students are practising, conference with each student in roll order, unless a student was absent and missed their conference. During the conference, ASSESS students if they are ready, or TEACH if they are not. Document or date whether students pass or not.
6. Keep individual ongoing records, and add data to Compass Continuum at the end of the year.
7. When a student achieves all the skills within a coloured belt, give them their certificate (in the photocopy room) and add their name to the Assembly Recognition document on the Drive.

Key considerations

- Maths Masters sessions do not have to be completed before or after a maths lesson
- Students (particularly in the middle and senior years) can be given access to more than 1 goal to practise at a time. They can choose when they feel ready to practise the next goal in the sequence
- If students are stuck on a goal or need extra support, use scaffolding so the goal is broken into multiple parts (Eg. Skip counting by 2s, 3s, 4s, practice skip counting by 2s first only)
- When the goal is new to students, encourage students to use manipulatives/whiteboards. Once students have built their understanding, encourage them to remove scaffolding and practise mentally
- Classroom set up of Maths Masters is level specific ranging from individual pockets with materials in them (P-2) to practise books (3-4)or display folders (5-6).
- **ASSESSMENT:** When assessing, students must be able to correctly answer the questions in 3 seconds or less without any materials (including fingers), unless advised otherwise on the assessment sheet.
- When assessing students, continue testing until students fail - reaching their learning goal. TEACH the new goal and MODEL appropriate practise activities
- If a student fails a test, check that they are practising the goal efficiently. TEACH the skill (scaffold if required) and MODEL appropriate practise activities. **DO NOT ASSESS AGAIN** until next in roll order and make a note to test them on Set B questions next time.

See it an action: Taryn assessing a grade 2 student, Taryn's grade 2 students practising MM, maths masters teacher tracker, Bella assessing (fail), Bella assessing (pass), Grade 1 explaining goal, Emily assessing till a fail

Maths Masters - Checklist for Classroom Observations

	✔
TEACHER	
Teacher is conferencing with individual students in roll order while the rest of the class practise	
DURING ASSESSMENT:	
Teacher passes student if they are fluent (<3 secs) (and teaches next goal)	
Teacher fails student if they are not fluent (and teaches current goal)	
DURING TEACHING:	
Teacher explains / teaches goal to student	
Teacher scaffolds or breaks goal down for student (if required)	
Teacher models how to practise goal	
STUDENTS	
Students know their Maths Masters goal - can articulate the skill (not just colour/number)	
Students can explain what they are doing to learn their goal	
Students are practising in a way that relates to their goal	
MIDDLE / SENIOR ONLY:	
Students can identify if they are fluent enough to be assessed or need to continue practising	

Troubleshooting

- Concern from parents and teachers about competition / comparisons between and against students

- A culture in the school focusing on personal goals and growth, and a celebration of achievement and excellence

Troubleshooting

- Students stalling in progress / feeling disheartened

- Helping teachers identify the cause of the stalling
- Breaking down goals into smaller more manageable chunks
- Being explicit with the smaller goals and celebrating those achievements

Troubleshooting

- Teachers not being accurate with assessment

- Professional Learning on assessment including videos of practice
- Tracking anomalies in data and addressing teams and individual teachers

Troubleshooting

- Students forgetting skills including pre-requisite skills

- Helping teachers identify and understand the pre-requisite skills
- Teaching students the importance of revising other skills before continuing on
- Breaking goals down to incorporate forgotten skills
- Incorporating fluency practice into Daily Reviews

Troubleshooting

- Students finishing the program

- Educating students, families and teachers about what fluency is and what it is not (in the context of Maths Masters)
- Allowing students to focus on tasks that involve Adaptation and Generalisation (from the Instructional Hierarchy)
- Algebra, Problem Solving, Fluency Maintenance, Communicating Mathematical Ideas

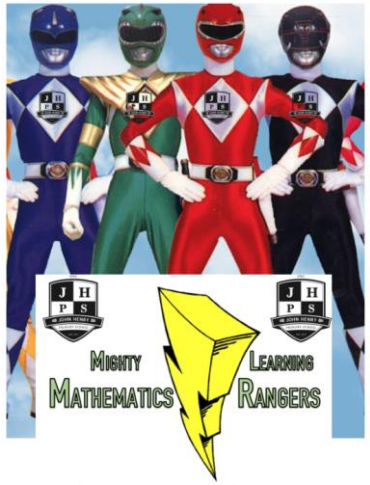
Features of a quality Fluency Program

- Whole school approach
- Developmental sequence of discrete skills
- Focused on the most foundational of skills
- Explicit and clear for students (and teachers)
- Regular opportunities to practise
- Differentiated / at point of need
- Embedded assessment

Fluency Program Options

LPS MATHS MASTERS

Serpentine Primary School



NFP
NUMBER FLUENCY PROGRAM
DR ANGE ROGERS

TOP

Rocket Math

TIMES TABLES ROCK STARS

M.I.N.D
Measures & Interventions for Numeracy Development

FactFreaks™

Recommended Further Reading/Listening

Math fact crisis:...

Friday Jul 05, 2024

In this first episode of a two-part series, math professor...

READ MORE

2 6.5K

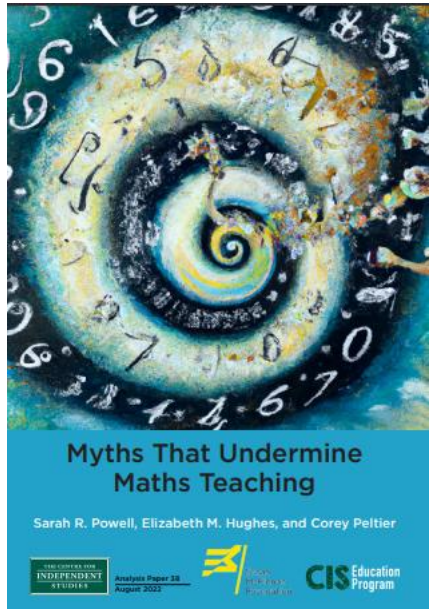
Math fluency matters with...

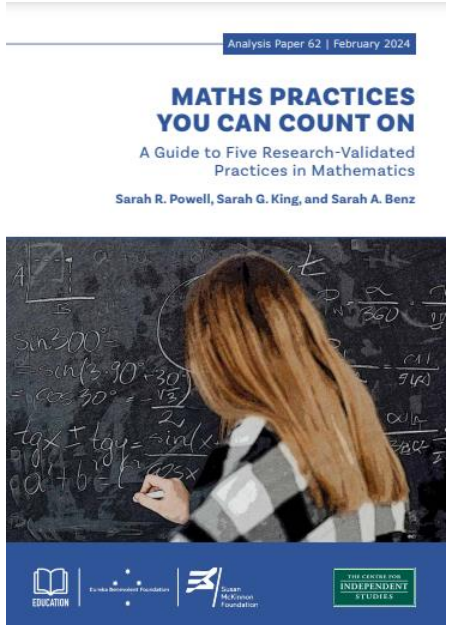
Friday Jul 12, 2024

In the second episode of a two-part series, math...

READ MORE

2 5.1K





Questions?

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Event App

App Download Instructions

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Step 2: Enter Event Code: **mav**

Step 3: Enter the email you registered with

Step 4: Enter the Passcode you receive via email and click 'Verify'. Please be sure to check your Junk Mail for the email, or see the Registration Desk if you require further assistance.

THE MATHEMATICAL ASSOCIATION OF VICTORIA

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Be in it to WIN!