Nau mai

haere mai

Hui 3 - Assessment

THE LEARNER FIRST™

Self-Understanding | Connection | Knowledge | Competency

Zoom Hui – Wide reach element of Project

- **July 22** – Planning
- **Aug 5** – Assessments
- **Aug 19** – Explict/Inquiry – Rich Tasks
- **Sep 2** – Whānau and community
- **Sep 16** – Diverse needs- level up/down

Posted on NZ Primary Maths a week before

Exisiting delegates invited to share

Recording emailed out each week

Ways to measure the whole ākonga

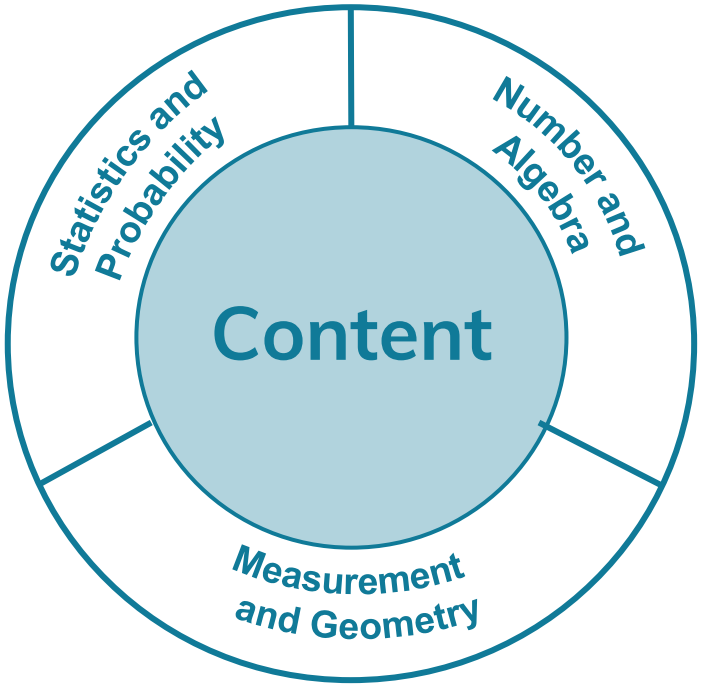
Procedural Fluency

Calculate with precision

Estimate with reasonableness

Recall definitions/facts

Use appropriate methods & measures



Deduce & defend arguments

Form logical conclusions

Prove generalisations

Identify and explain patterns

Adaptive Reasoning

Conceptual Understanding

Recognise representations

Describe & **express** ideas

Connect related concepts

Predict outcomes, relationships

Find & use a model

Solve & pose 'real' problems

Evaluate & adapt strategies

Justify reasonableness

Problem Solving

Productive Disposition

See mathematics as worthwhile

Identify meaning in their world

Believe in one's own efficacy

Participate effectively in groups

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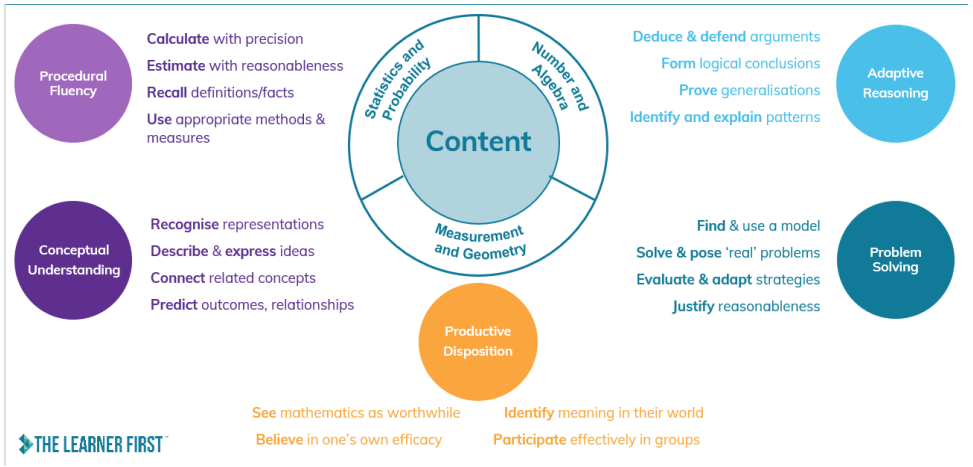
Proficiencies activate the key competencies



Using symbols and texts

- Communicate with mathematical terminology.
- Applying ICT to calculate, communicate and create
- Interpret mathematical texts, graphics & representations

Relate to others

- Using norms to share and gather learning.
- See maths in new contexts
- Involves school, whānau, global

Managing self

- Explain what they learn, where they are and where they need to go
- Persevere with their learning
- Set & describe their learning goals

Particpate & contribute

- Collaborate and listen to solve problems together
- Sees group work as catalyst to try new ideas
- Understands opportunities to compete and cooperate

Thinking

- Reflect on their own learning
- Critically evaluate evidence and make sense of complex learning
- Explore alternative strategies and create new learning and ideas

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What we measure: Our line of sight

In a range of meaningful contexts students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to....

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What we measure: Our line of sight

Exploring
Questioning
Conjecturing
Explaining
Proving
Justifying
Generalising

What we measure: Our line of sight

In a range of meaningful contexts students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to....

What we measure: Our line of sight

A cyclical process where

meaningful situations are translated into mathematical language/symbols/representations and the solutions and solution pathways evaluated and communicated

What we measure: Our line of sight

In a range of meaningful contexts students will be engaged in thinking mathematically and statistically. They will solve problems and model situations that require them to....

Problems

Simple tasks on mathematical procedures to practise skills. Little effort beyond remembering

Transparent problems within a context. Often have 1 or 2 steps before a solution

Several pathways and/or solutions to promote discussion and connection

Complex, multi-step problems. Connect strands and other subject areas. Short responses to inquiry projects

Research has documented that when students are primarily asked to solve tasks of low-cognitive demand, they have few opportunities to develop:

- an understanding of ***why*** particular procedures are appropriate;
- disciplinary practices like **flexible problem-solving**;
- the ability to explain/connect their mathematical thinking
- a conceptual understanding of mathematical ideas (connect)

Boaler & Staples

Valuing and developing Mathematical Proficiencies

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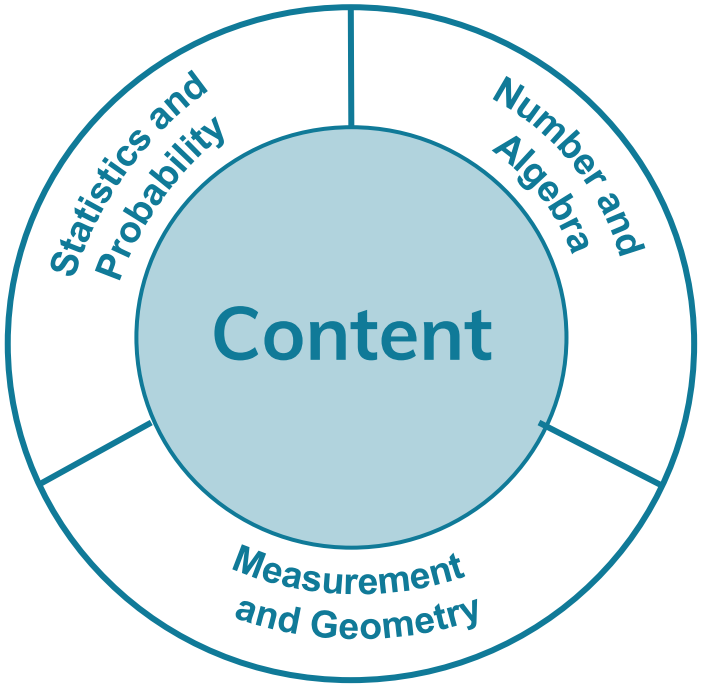

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Multiplying fractions – *Smith & Stein 1998*

Procedural Fluency

Memorise the rule

Worked examples and procedures without connections:

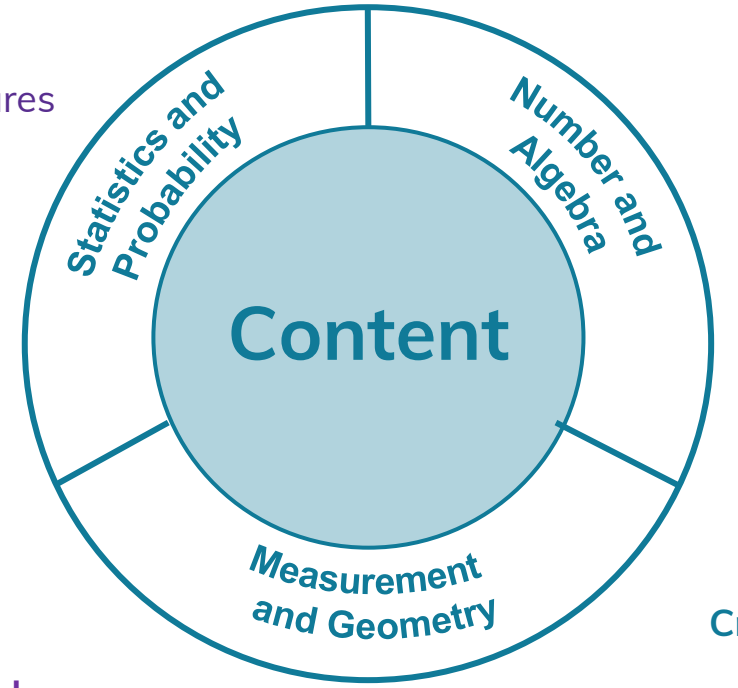
$\frac{2}{3} \times \frac{3}{4}$

$\frac{5}{6} \times \frac{7}{8}$

Conceptual Understanding

Procedures with connections

Find 1/6 of 1/2. Use pattern blocks. Draw your answer and explain your solution.



Productive Disposition

Adaptive Reasoning

Doing maths

Create a real world situation for

$\frac{5}{6} \times \frac{7}{8}$

Problem Solving

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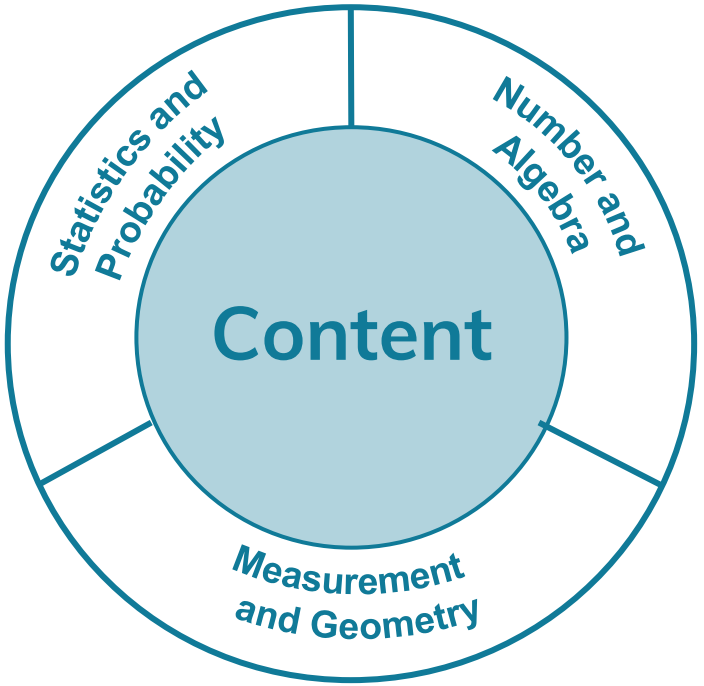
What big ideas do we promote and measure?



Assessment that connects and covers all concepts

Level 2 - Curriculum Achievement Objectives

Number Strategies – key ideas	Number knowledge – key ideas	Equations & Expressions – key ideas
Numbers can be partitioned and combined to solve simple addition and subtraction problems. Students recognise part-whole thinking and apply it to derive results from known facts and finding addition answers by using doubles or teen numbers. Strategies include Compensation e.g., **7 + 6; 6 + 6 = 12, so 7 + 6 = 13** PV partitioning e.g., **23 + 13; (20 + 10) + (3 + 3) = 30 + 6 = 36**	Our number system is based on groupings of the number ten. We have ten-digit symbols, 0-9, and their value is defined by their position within a number. Digits in any column are worth ten times as much as those in the column to the right. Students develop an understanding of place value. "Houses' can be used to show columns e.g., **7 in tens represents 7 tens or 70 ones. Whereas a 7 in the ones represents 7 ones**	Number operations and strategies to solve number operations can be recorded using words, numbers, diagrams and symbols and then explained using these. Empty number lines and arrays Understand **7 + 2 = 5 + 4**
Number Strategies – elaborations **NA2-1: Use simple additive strategies with whole numbers and fractions**	**Number knowledge – elaborations** **NA2-2: Know forward and backward counting sequences with whole numbers to at least 1000.** **NA2-3: Know the basic addition and subtraction facts.** **NA2-4: Know how many ones, tens, and hundreds are in whole numbers to at least 1000.** **NA2-5: Know simple fractions in everyday use.**	**Equations & Expressions – elaborations** **NA2-6: Communicate and interpret simple additive strategies, using words, diagrams (pictures) and symbols**
NA2-1 Treat whole numbers as units of one – can be split and recombined to make calculations easier. Additive is a type of thinking not an operation of addition. Additive thinking can be applied to:- addition **eg (47 + 38 is 50 + 40 -5)** subtraction **eg (74 – 8 = [] as 74 – 4 – 4 = [])** multiplication **eg (4 x 4 = [] as 4 + 4 + 4 + 4, or 8 + 8 = [])** division **eg (18 ÷ 3 = [], as 5 + 5 + 5 = 15, so 6 + 6 + 6 = 18** fractions of sets **e.g. halves, thirds, quarters, eighths** Links to EA stage of Number Framework	**NA2-2** Know how to read and write number sequence to 1000 (forward and backward counting) Know multiples of one ten **eg 358, 348, 338, ??)** and one hundred **eg 647, 547, 447, ??)** Name the number before and after any given number (1s, 10s, 100s) **eg 800 becomes 799 if one is removed, and 608 becomes 598 is ten is remove** **NA2-3** Know basic facts up to 9 + 9 = [] e.g., **6 + 4 , 9 + 3,** and corresponding subtraction **10 – 6, 12 - 9** Understand commutativity eg **(4 + 7 = 7 + 4)** Understand inverse **eg (6 + 7 = 13 so 13 – 7 = 6)** **Encounter start/change unknown** eg **(4 + [] = 12, [] – 5 = 8** **NA2-4** Develop an **additive view** of whole number place value eg **456 is 4 hundreds, 5 tens and 6 ones** Understand the **nested view** of place value eg **(456 has 45 tens and 456 ones)** Expose to **456 + 70 = [], or 456 – {] = 396 to promote nesting in calculations** **NA 2-5** Understand digits in fractions, how they are written and said, their relative size, and how to order common denominator. Numerator is the count, and the denominator is the size of the parts. Fractions are repeats of a unit fraction e.g., **¾ = ¼ + ¼ + 1/4 and 4/3 = 1/3 + 1/3 + 1/3 + 1/3** Whole numbers can be written as fractions **1 = 3/3, 4/4... and fractions can be greater than 1.**	**NA2-6** Use words, symbols and diagrams to explain their number strategies to others. Write addition, subtraction, multiplication and division equations understanding = as 'equal to' Use empty number lines to record add/subtract strategies. Use arrays to record simple mult/div strategies Formal algorithms for multi-digit addition and subtraction should **NOT** be taught at Level2 until PV understanding is applied.
Patterns and relationships – key ideas	**Patterns and relationships – elaborations** **NA2-7: Generalise that whole numbers can be partitioned in many ways.**	

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Number/Algebra Level 2

Know multiples of one and ten **eg 358, 348, 338, ??)** and one hundred **eg 647, 547, 447, ??)**

Know 1,10,100 more less eg **800 becomes 799 if one removed, and 608 becomes 598 if ten removed**

Develop an **additive view** of whole number place value eg **456 is 4 hundreds, 5 tens and 6 ones**

Understand the **nested view** of place value eg **(456 has 45 tens and 456 ones)**

Solve **456 + 70 = [ ], or 456 – [ ] = 396** **to promote nesting in calculations**

Understand digits in fractions, how they are written and said, their relative size, and how to order common denominator.

Know Fractions are repeats of a unit fraction e.g., **¾ = ¼ + ¼ + 1/4 and 4/3 = 1/3 + 1/3 + 1/3 + 1/3**

Whole numbers can be written as fractions **1 = 3/3, 4/4... and fractions can be greater than 1.**

Explore sequential spatial or numeric patterns. Identify repeating element and use this to predict what comes next

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Some assessments could give us valuable insights

9 + 6 :	I made a 10 an added 5
6 x 5:	I memorised 6 x 5 is 30
20 ÷ 4:	I know there are 5 fours in 20
57 – 25	I did (50 – 20) + (7 – 5), no decomposing needed
Fraction Q	I was unable to do a fraction question
24 ÷ 2 :	I knew that half of 20 is 10 and half of 4 is 2 so together it is 12
[ ] + 26 = 86:	I know the inverse so I did (80 – 20) + (6 – 6)
8 x 6:	I know 5 x 8 is 40 and then added 8 on .

Is this enough to allocate a Curriculum Level?

Have my ākonga been given a chance to show what they know...
Big Ideas

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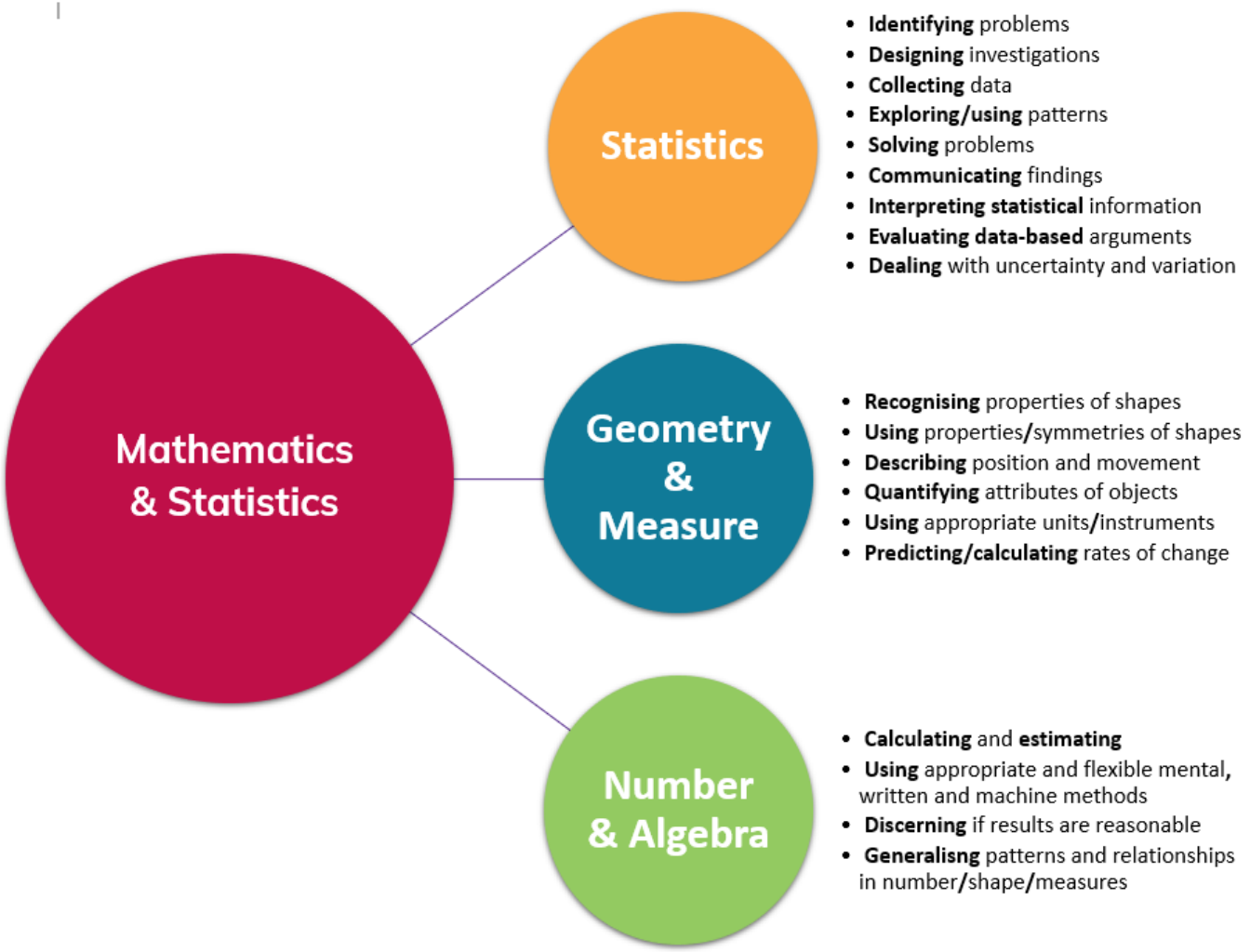
Have my ākonga been given a chance to show what they know...
Strands and sub-strands



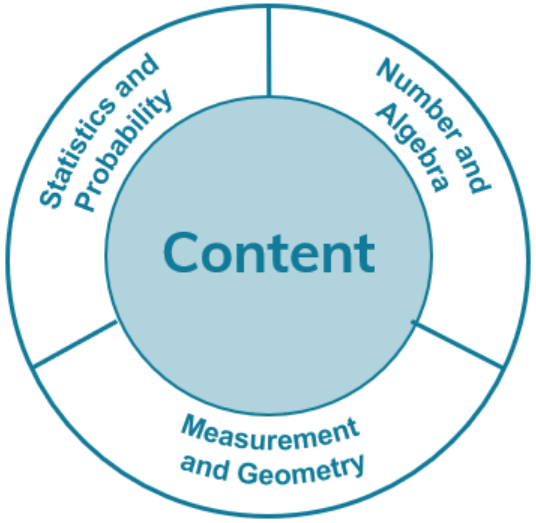
Have my ākonga been given a chance to show what they know... Mathematical Proficiencies and competencies

Procedural Fluency

- **Calculate** with precision
- **Estimate** with reasonableness
- **Recall** definitions/facts
- **Use** appropriate methods & measures

Conceptual Understanding

- **Recognise** representations
- **Describe** & **express** ideas
- **Connect** related concepts
- **Predict** outcomes, relationships



Adaptive Reasoning

- **Deduce & defend** arguments
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- **Identify and explain** patterns

Problem Solving

- **Find** & use a model
- **Solve & pose** 'real' problems
- **Evaluate & adapt** strategies
- **Justify** reasonableness

Productive Disposition

- **See** mathematics as worthwhile
- **Believe** in one's own efficacy
- **Identify** meaning in their world
- **Participate** effectively in groups

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Have my ākonga been given a chance to show what they know... through a balance of problem types

Exercise

Simple tasks on mathematical procedures to practise skills. Little effort beyond remembering

Application

Transparent problems within a context. Often have 1 or 2 steps before a solution

Open ended (rich)

Several pathways and/or solutions to promote discussion and connection

Unfamiliar (rich)

Complex, multi-step problems. Connect strands and other subject areas. Short responses to inquiry projects

Have I been able to balance assessment methods to maximise my instruction time

Maybe number strategies could be formatively tracked and measured through ongoing games and teacher observations: (buy back hours for some kaiako)

Maybe open-ended inquiry tasks that we do each week could be gathered once a term to get insights into mathematical thinking skills

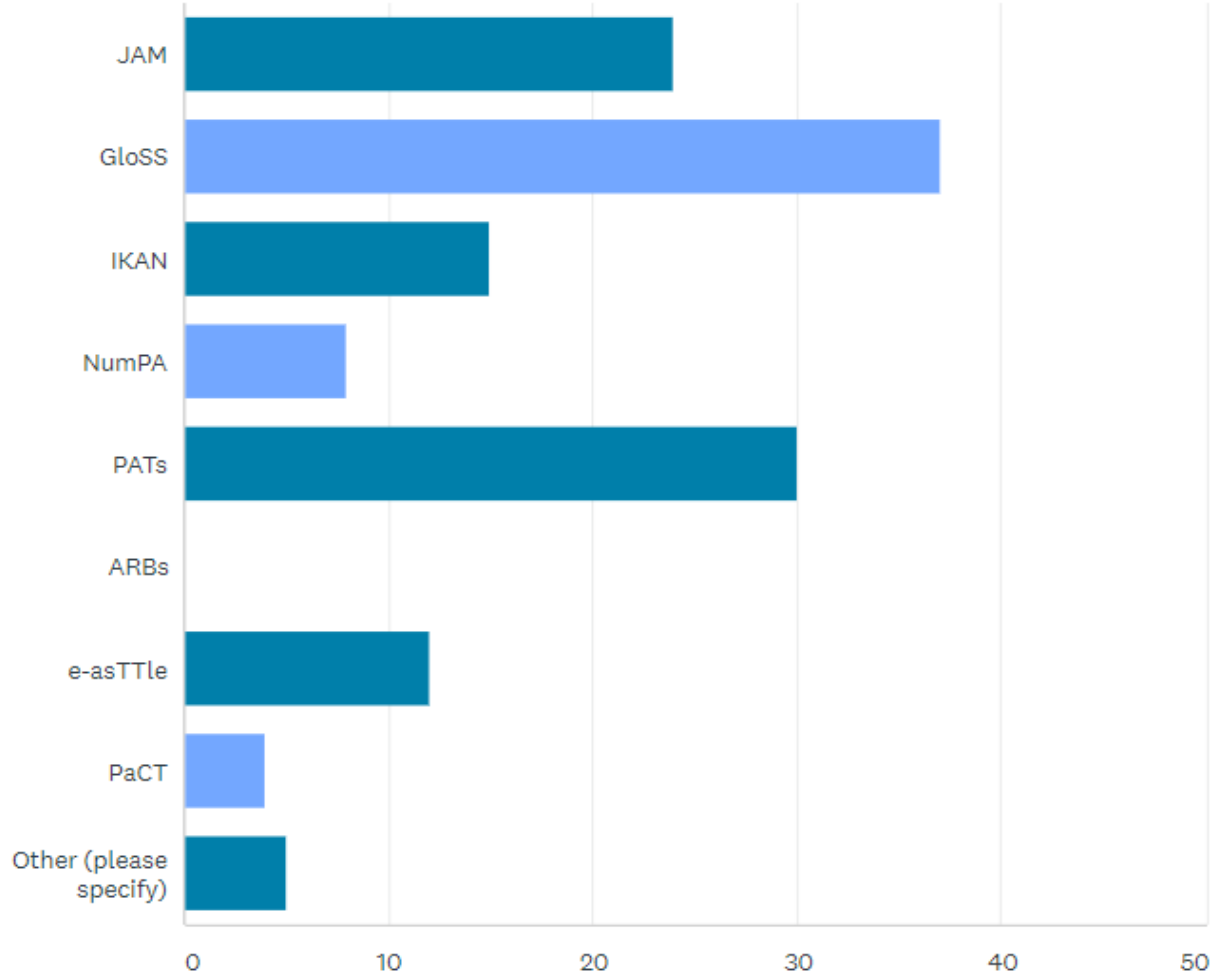
Maybe we could contextualise number with shape, measurement and probability to promote the connectivity of mathematics, maybe use statistical investigations to teach some number knowledge

Maybe we could explore which assessment tools would give us a more holistic measurement of all mathematical skills, behaviours and dispositions....

and maintain or even reduce the time gathering data, so we can analyse and use it

Deeper insights in less time

A survey snaphot-
Which assessment tools do you use to track progress and achievement?



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Learning Progressions

Additive thinking
compare quantities using informal language. They know some number names and parts of the number-word sequence, and they may subitise (instantly recognise) small quantities.
use one-to-one correspondence, their knowledge of the number-word sequence, cardinality, and ordinality as they count sets of objects.
count all of the objects to solve simple addition or subtraction problems. They do this with real objects or by imaging the objects.
solve problems involving the addition or subtraction of single-digit numbers by counting on or back from the larger number. The language of the problem guides the student to the operation of addition or subtraction.
recognise that numbers are **abstract units that can be either treated as wholes or partitioned and recombined.** This is called part-whole thinking. Students partition single-digit numbers to form "tidy numbers" or use known addition facts to ten to solve problems. The language of the problem guides the student to the operation of addition or subtraction.
solve problems involving two- and three-digit numbers, in which the mathematical operation is transparent in the wording, by applying a strategy from a limited rehearsed repertoire. The strategies are most likely to involve **place-value partitioning**, or compensation when the number is close to a tidy number.
respond **flexibly** to addition and subtraction problems involving whole numbers and simple **decimals** by applying and explaining a **range of strategies,** including the use of inverse operations, as they seek the most efficient method.
demonstrate **flexibility**, **a strong number sense**, and an ability to carry out multiple steps as they **estimate** and solve complex problems that involve adding and subtracting whole numbers, **decimals**, fractions, and integers.

A network of game changers

TLF Maths - Ideas and Insights

Private group · 324 members

Joined + Invite