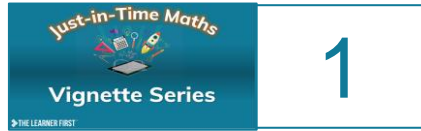# Just-in-Time Maths
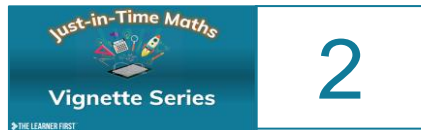
Vignette Series
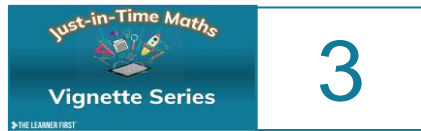
Just-in-Time Vignettes

1 Curriculum intent

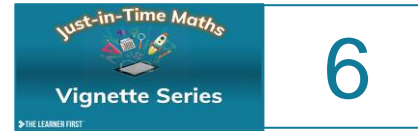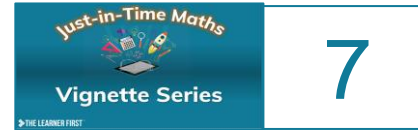**2** A rich balance

3 NZ Maths - a great place to start
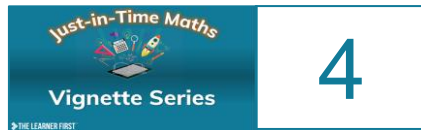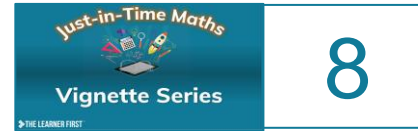
4 Place Value – The big ideas

5 Place Value – read, write and order

6 Place Value – expand and nest

7 Place Value – rename and round

8 Place Value- mental computation

9 Rapid Routines

10 Assessment

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Self-Understanding | Connection | Knowledge | Competency

Maths – Ideas and insights TLF

A stronger depth leads to a stronger connect

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

Content

Statistics and Probability

Number and Algebra

Measurement and Geometry

Productive Disposition

Adaptive Reasoning

Deduce & defend arguments

Form logical conclusions

Prove generalisations

Identify and explain patterns

Problem Solving

Find & use a model

Solve & pose 'real' problems

Evaluate & adapt strategies

Justify reasonableness

See mathematics as worthwhile

Identify meaning in their world

Believe in one's own efficacy

Participate effectively in groups

Self-Understanding | Connection | Knowledge | Competency

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Maths – Ideas and insights TLF

These link to ākonga mathematical proficiencies

Mathematics & Statistics

Statistics
- **Identifying** problems
- **Designing** investigations
- **Collecting** data
- **Exploring/using** patterns
- **Solving** problems
- **Communicating** findings
- **Interpreting statistical** information
- **Evaluating data-based** arguments
- **Dealing** with uncertainty and variation

Geometry & Measure
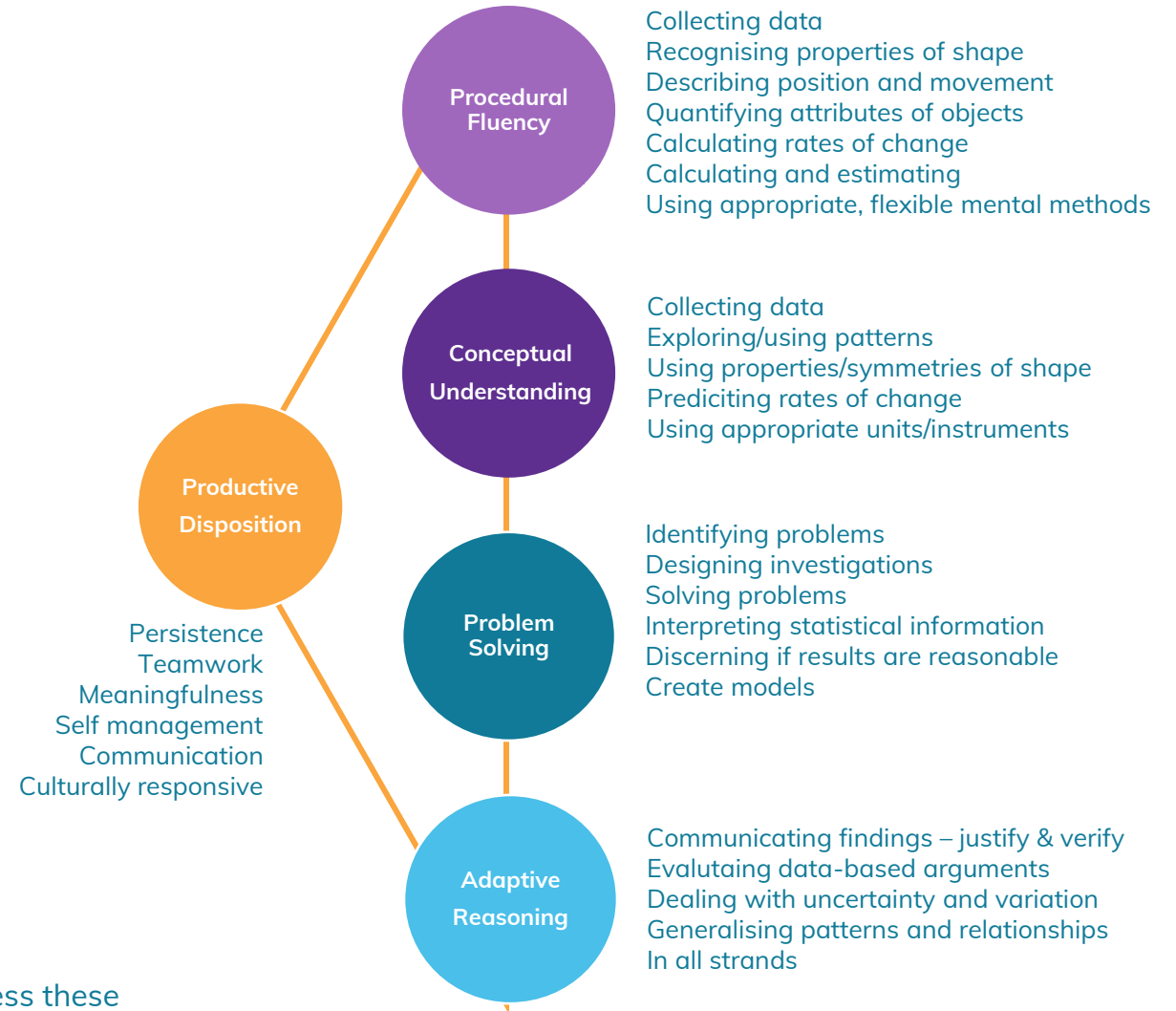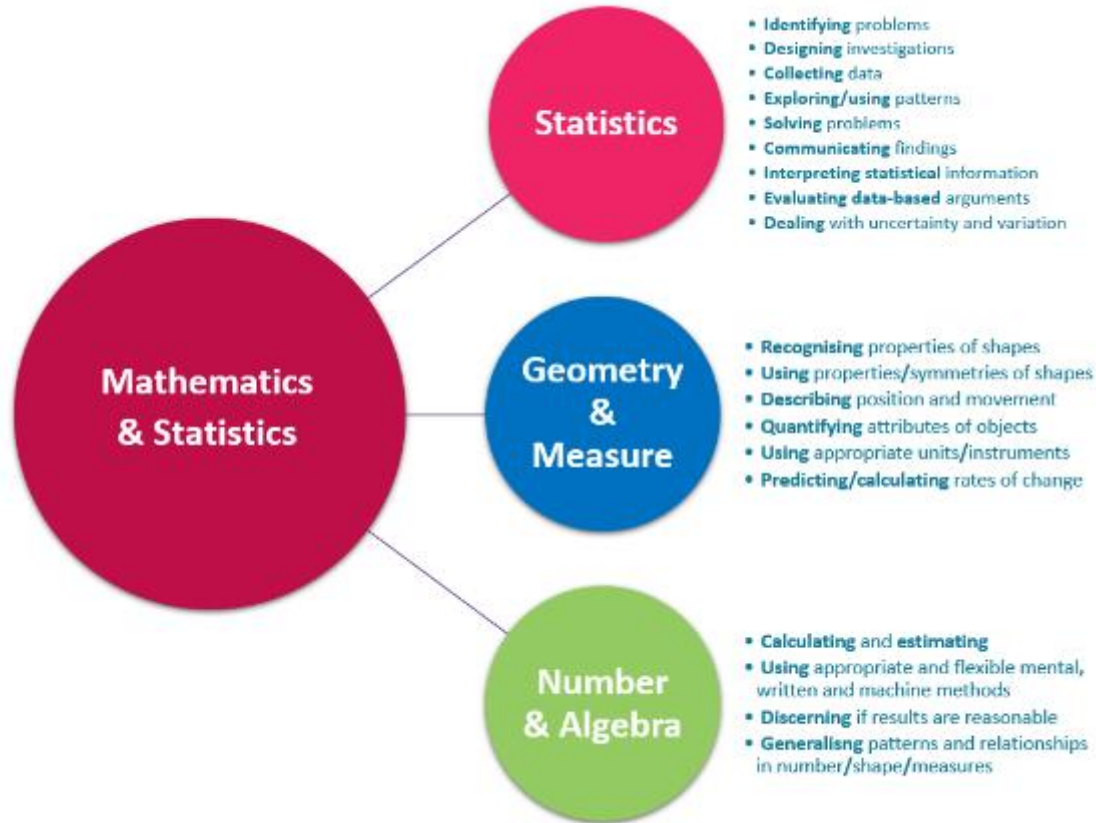- **Recognising** properties of shapes
- **Using** properties/symmetries of shapes
- **Describing** position and movement
- **Quantifying** attributes of objects
- **Using** appropriate units/instruments
- **Predicting/calculating** rates of change

Number & Algebra
- **Calculating** and **estimating**
- **Using** appropriate and flexible mental, written and machine methods
- **Discerning** if results are reasonable
- **Generalising** patterns and relationships in number/shape/measures

Productive Disposition
Persistence
Teamwork
Meaningfulness
Self management
Communication
Culturally responsive

Procedural Fluency
Collecting data
Recognising properties of shape
Describing position and movement
Quantifying attributes of objects
Calculating rates of change
Calculating and estimating
Using appropriate, flexible mental methods

Conceptual Understanding
Collecting data
Exploring/using patterns
Using properties/symmetries of shape
Prediciting rates of change
Using appropriate units/instruments

Problem Solving
Identifying problems
Designing investigations
Solving problems
Interpreting statistical information
Discerning if results are reasonable
Create models

Adaptive Reasoning
Communicating findings – justify & verify
Evalutaing data-based arguments
Dealing with uncertainty and variation
Generalising patterns and relationships
In all strands

Ākonga explore relationships in quantities, space and data and learn to express these relationships in ways that help them to make sense of the world around them – cultural, scientific, technological, health, environmental and economic contexts.

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Self-Understanding | **Connection** | **Knowledge** | **Competency**

A spotlight on Conceptual Understanding

Conceptual Understanding

$$\frac{1}{3} + \frac{1}{5}$$

- I can draw a picture or use materials
- I can use a number line or create a story
- I could rename the fraction to arrive at a common measure

$$8 \times 7$$

- I can represent this as an array
- I can represent this as a social situation
- I can derive new facts from this fact

An example from Year 7 and 8

Estimate and explain why this is right or wrong
9.83 x 7.65 = 7519.95

Procedural Fluency

- withdraw from doing it if a calculator is not allowed
- revert to pen and paper methods (not understanding estimate)
- solve it with errors in procedure eg 7.519, 751.995

Procedural Fluency **Conceptual Understanding**

- know it is not right without calculating
- applies rounding to represent this as 10 x 8
- reasons that the digits are correct but decimal is incorrect

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Self-Understanding | Connection | Knowledge | Competency

Maths – Ideas and insights TLF

NZ Maths can help us identify these skills

Maths consists of skills, processes and dispositions
The skills are what we are familiar with and are largely found in the strands and sub strands

Elaborations on Level Four: Number and Algebra

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:

Number strategies and knowledge

NA4-1: Use a range of multiplicative strategies when operating on whole numbers.

This means students will apply the properties of multiplication and division (commutative, distributive, associative and inverse) to number problems, particularly those requiring multiplication and division. Students should exercise critical choice in their method of calculation - mental, machine or paper - and recognise situations in which estimation should be used, including the checking of calculated answers. Strategies expected at Level Four include: using common factors and multiples, for example $37 + 41 + 40 + 38 = \square$ as $4 \times 40 - 4$, using the distributive property, for example $24 \times 36 = 20 \times 36 + 4 \times 36$, $9 \times 78 = 9 \times 80 - 9 \times 2$, or $276 \div 12 = 240 \div 12 + 36 \div 12$, using the associative property, for example $12 \times 33 = 4 \times 99$, or $216 \div 12 = 216 \div 2 \div 2 \div 3$, and inverse operations (reversing), for example $354 \div 6 = \square$ as $6 \times \square = 354$. This objective also involves calculating powers, for example $4^3 = 4 \times 4 \times 4 = 64$, and factorials, for example $4! = 1 \times 2 \times 3 \times 4 = 24$. Students should have strong mental strategies for operations on whole numbers but also accurately carry out standard written algorithms, particularly for multi-digit multiplication and division. Level Four corresponds to the Advanced Multiplicative stage of the number framework.

Procedural Fluency

Conceptual Understanding

This enables us to better teach, measure and nurture growth

NA3-1 Use a range of additive and simple multiplicative strategies..

A range of mental strategies using partitioning and combining. These include: -

standard PV **604 – 383 = [] as 60 – 38 tens less one (219)**

NA3-3 Know counting sequences for whole numbers.

Know fwd/bwd counting patterns e.g., **1 000 000, 999 999, 999 998,** beginning with any whole number

Know multiples of one, ten, hundred, thousand **1250, 2250, 3250,??**

Know 701 000 results in **691 000 if 10 000** is taken from it. **43 560** is **43 559** if one is taken from it

Know sequences in tenths **e.g., 4.7, 4.8, 4.9, 5....**

NA3-4 Know how many tenths, tens, hundreds and thousands are in whole numbers.

Have a multiplicative view of whole number place value. In 239 456 the 3 means 3 groups of 10 000

Understand the **Base 10** scaling view- **10 of these is 1 of those**- as digits move right or left

Understand the **nested view** e.g., **239 456 has 23 ten thousand, 2394 hundreds, and 23 945 tens.**

Expose to exercises like this: 2004 – 700 requires us to think of 1000 as ten hundreds so 20 hundred take 7 hundred

Know **one hundred thousand is ten times as much as ten thousand,** and one hundred is result of dividing one thousand by ten. Eg **4200 is ten times more than 420, 43 divided by 10 is 4.3**

I can see instant ways to adapt tasks

I can communicate clear learning outcomes

I can look for evidence as I monitor ākonga

Self-Understanding | **Connection** | **Knowledge** | **Competency**

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Maths – Ideas and insights TLF

Problem solving and reasoning

In a range of meaningful contexts, students will be engaged in

thinking mathematically and statistically.

Exploring
Questioning
Conjecturing
Explaining
Proving
Justifying
Generalising

Problem Solving

Adaptive Reasoning

They will **solve problems** and **model situations**

Authentic, rich tasks

that require them to ..

[link to Level objectives]

- **translated into mathematical language, symbols and representations and,**

- **the solutions and solution pathways evaluated and communicated**

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Self-Understanding | Connection | Knowledge | Competency

Maths – Ideas and insights TLF

Adaptive reasoning is the 'glue' to hold it all together

Adaptive
Reasoning

Three conditions to support it;

1) A sufficient knowledge of CU and PF
2) A task that is understandable and motivating
3) A context that is familiar and comfortable

Which proficiencies are your ākonga already strong in?

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