

Numeracy

August 2023

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NSW Department of Education





Acknowledgement of Country

We recognise the Ongoing Custodians of the lands and waterways where we work and live. We pay respect to Elders past and present as ongoing teachers of knowledge, songlines and stories.

We strive to ensure every Aboriginal and Torres Strait Islander learner in NSW achieves their potential through education.

Five ways maths is used in aboriginal cultures: <https://education.nsw.gov.au/parents-and-carers/everyday-maths/primary/resources/five-ways-maths-is-used-in-aboriginal-culture#:~:text=Five%20ways%20maths%20is%20used%20in%20Aboriginal%20culture%20from%20counting,symbols%2C%20storytelling%20and%20land%20markers>.

Objectives

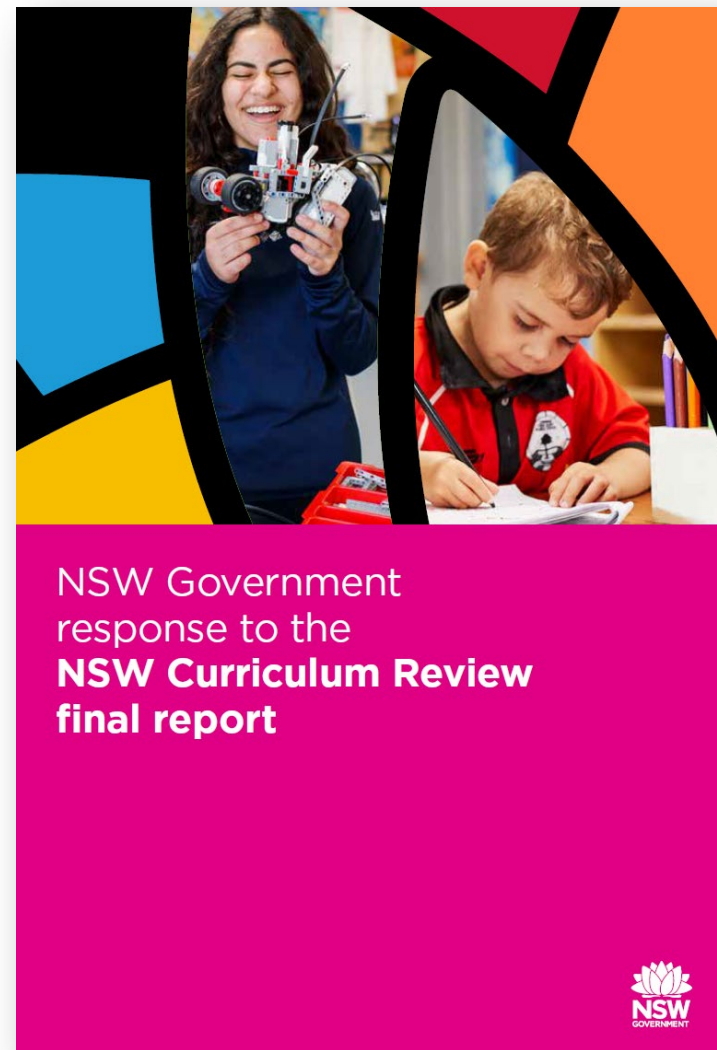
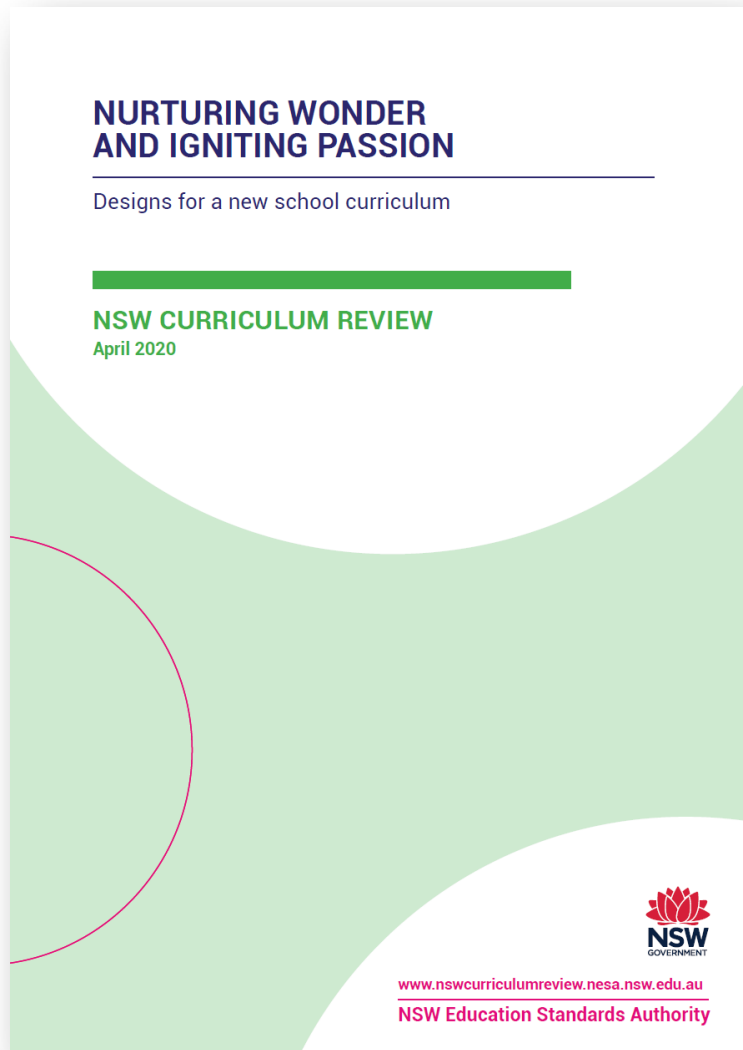


This session intends to support participants to:

- engage with definitions of numeracy
- understand the numeracy demands in syllabuses
- consider the numeracy resources and professional learning that pre-service teachers can leverage.






<https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy>

Curriculum Review



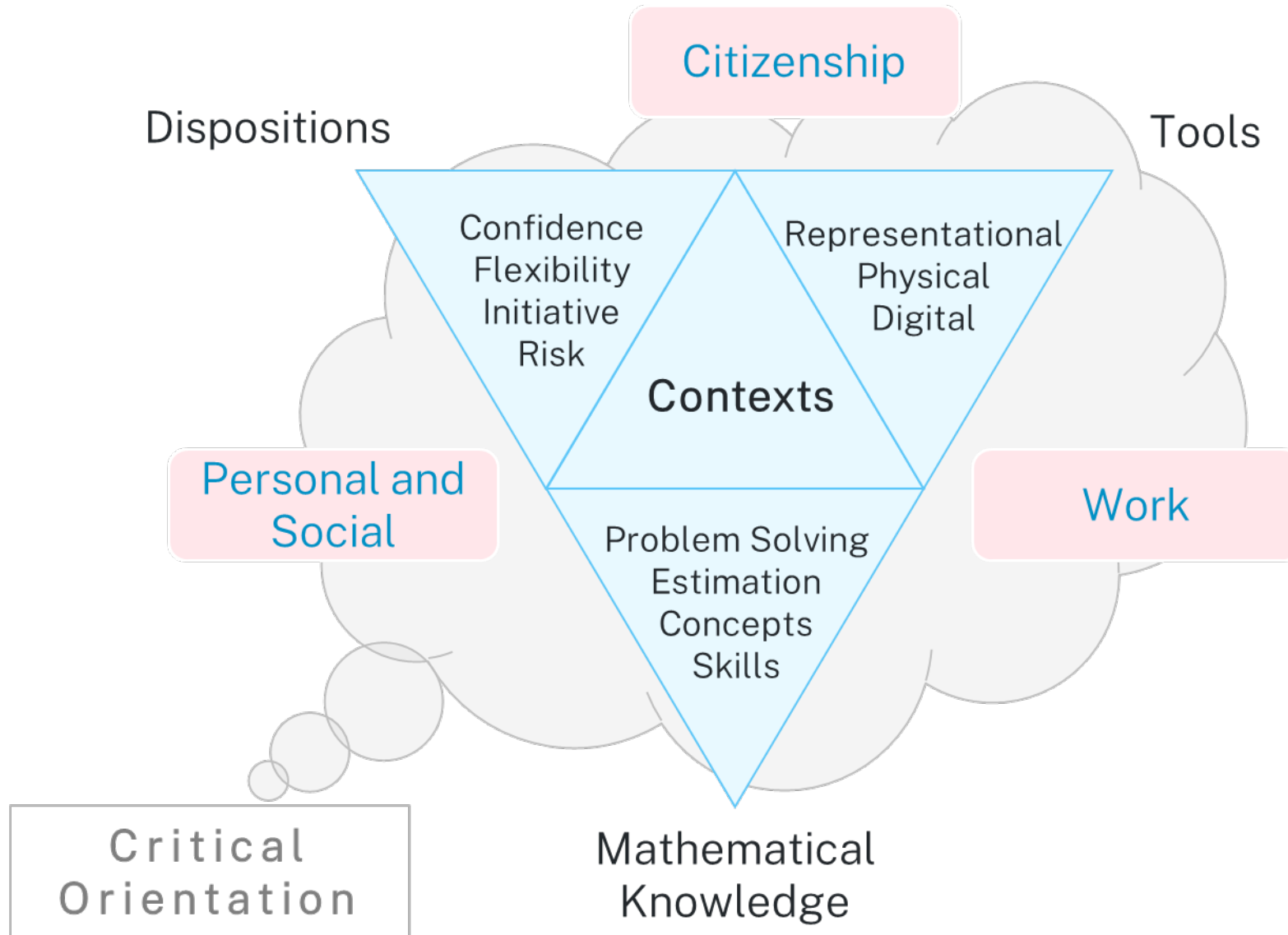
<https://nswcurriculumreform.nesa.nsw.edu.au/home/homePageContent/view>

The literacy and numeracy five priorities

-  1 There is a whole school and system approach to literacy and numeracy achievement from preschool to Year 12
-  2 School leadership is focussed on improving student literacy and numeracy
-  3 All teachers use effective practices to improve student literacy and numeracy outcomes through curriculum
-  4 Schools and systems use data to inform literacy and numeracy improvement
-  5 Families are supported as partners in their children's literacy and numeracy development

Numeracy Model

Model for 21st Century Numeracy (Goos, 2007)





Digital curriculum

A NSW Government website

Welcome to the NSW Curriculum website

Give us your feedback

Go to the NESA website 

 **NSW Curriculum**
NSW Education Standards Authority

Home Learning areas ▾ Stages ▾ **Teaching and learning** ▲ Resources ▾ Custom download/view

Teaching and learning →

| | | |
|----------------------------|----------------------|--|
| Introduction | NSW Curriculum | Place in the curriculum and course types |
| Diversity of learners | Aboriginal Education | Learning across the curriculum |
| Safety and risk management | | |

The numeracy general capability

Numeracy involves understanding and applying mathematical knowledge and skills in a wide range of contexts. The application of mathematics across the curriculum enriches the study of other learning areas and helps to develop a broader and deeper understanding of numeracy.

A numerate person (Hogan, 2000) uses a blend of:

- *mathematical knowledge*: concepts and skills within mathematics
- *contextual knowledge*: to recognise and link mathematics to broader situations
- *strategic knowledge*: to apply mathematics in situations and evaluate if the solution is reasonable.

Students are provided with opportunities to:

- develop knowledge and skills to use mathematics confidently at the school level and beyond
 - develop the mathematical proficiencies of understanding, fluency, reasoning and problem-solving
 - apply their knowledge of mathematics in a variety of contexts and circumstances, choosing the appropriate mathematical concepts, and critically evaluating its use.
-

About the Literacy and Numeracy Progressions

The National Literacy and Numeracy Learning Progressions:

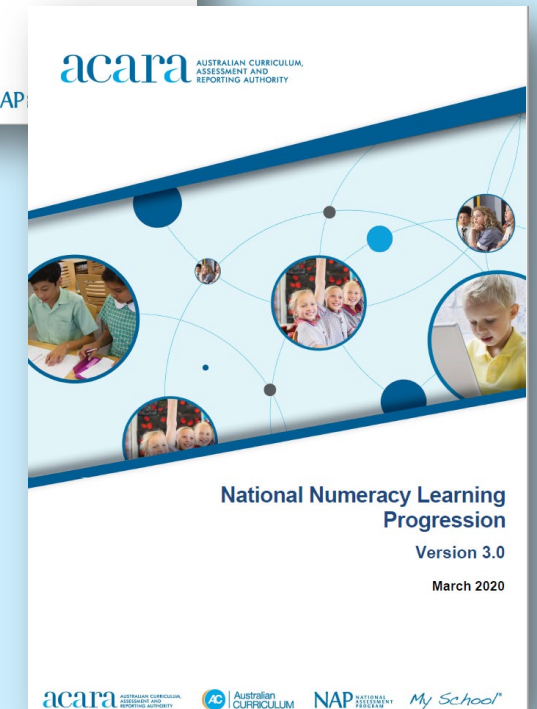
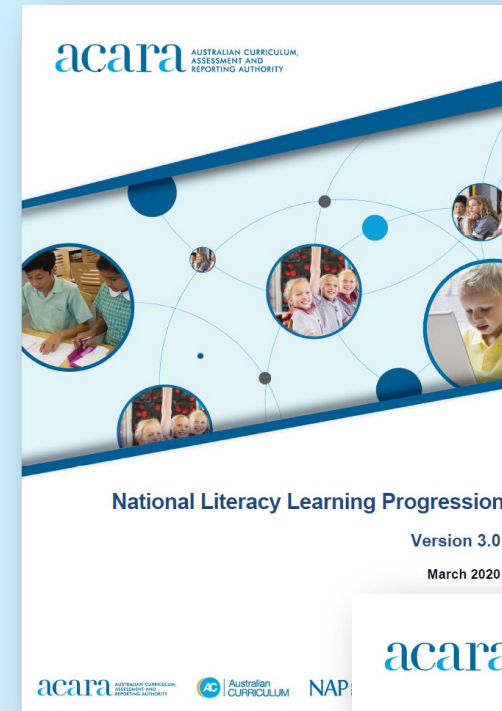
Strengthen teacher knowledge and create shared understanding

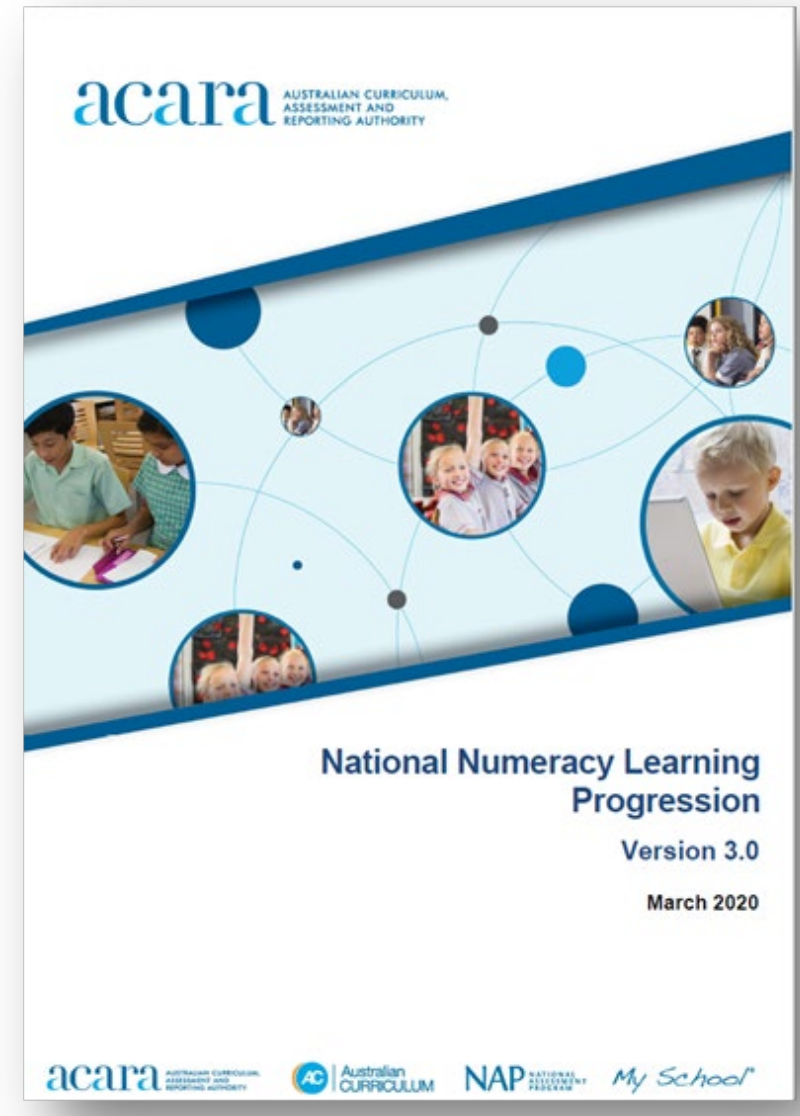
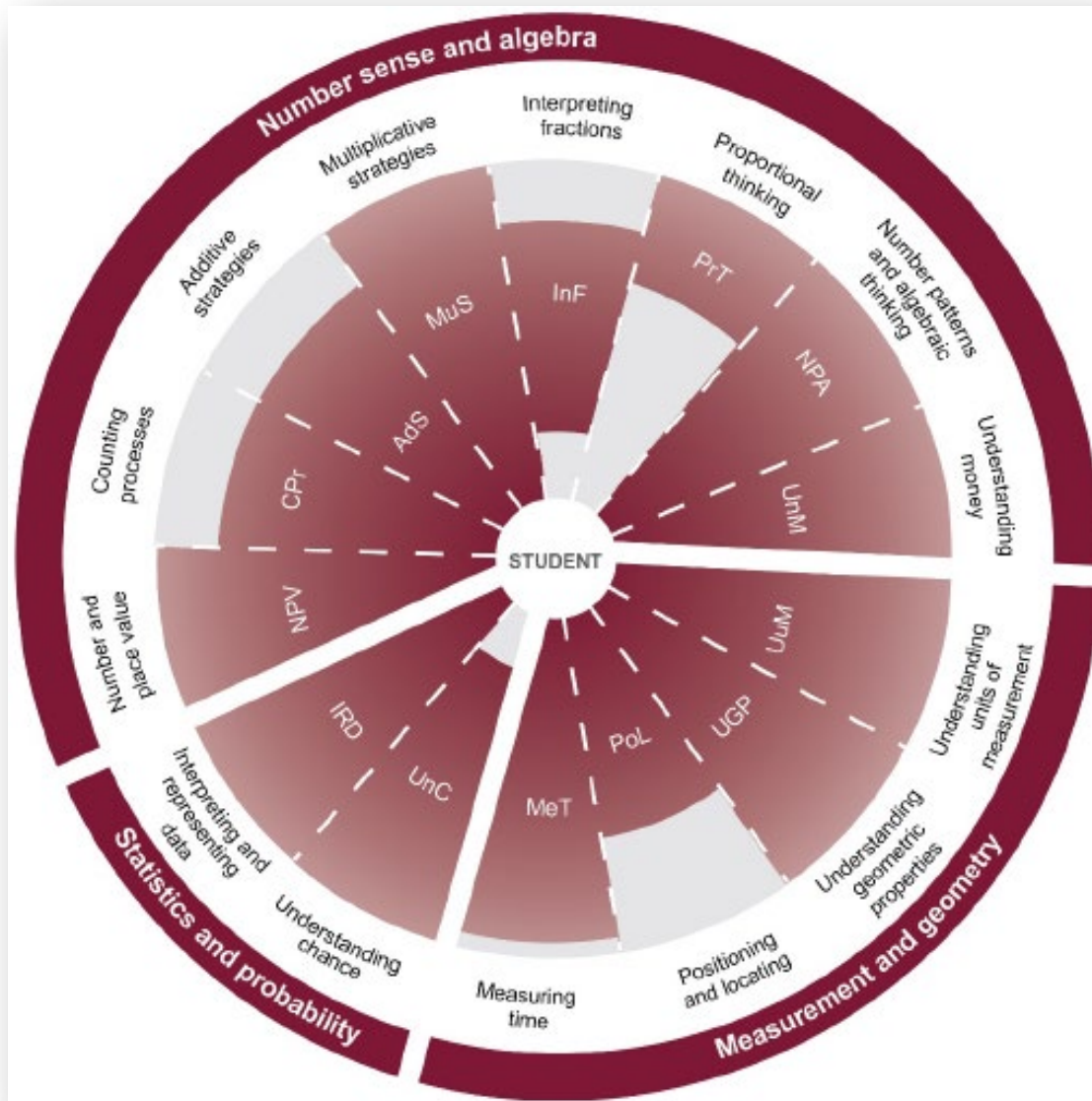
Help teachers to identify L&N needs, target teaching, monitor progress

Support differentiation, feedback for next steps.

Support syllabuses

Support initiatives in Strategic Improvement Plans





<https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/resources-for-schools/learning-progressions>

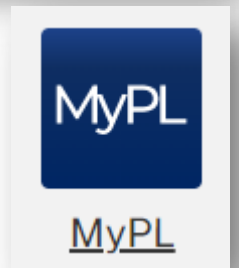
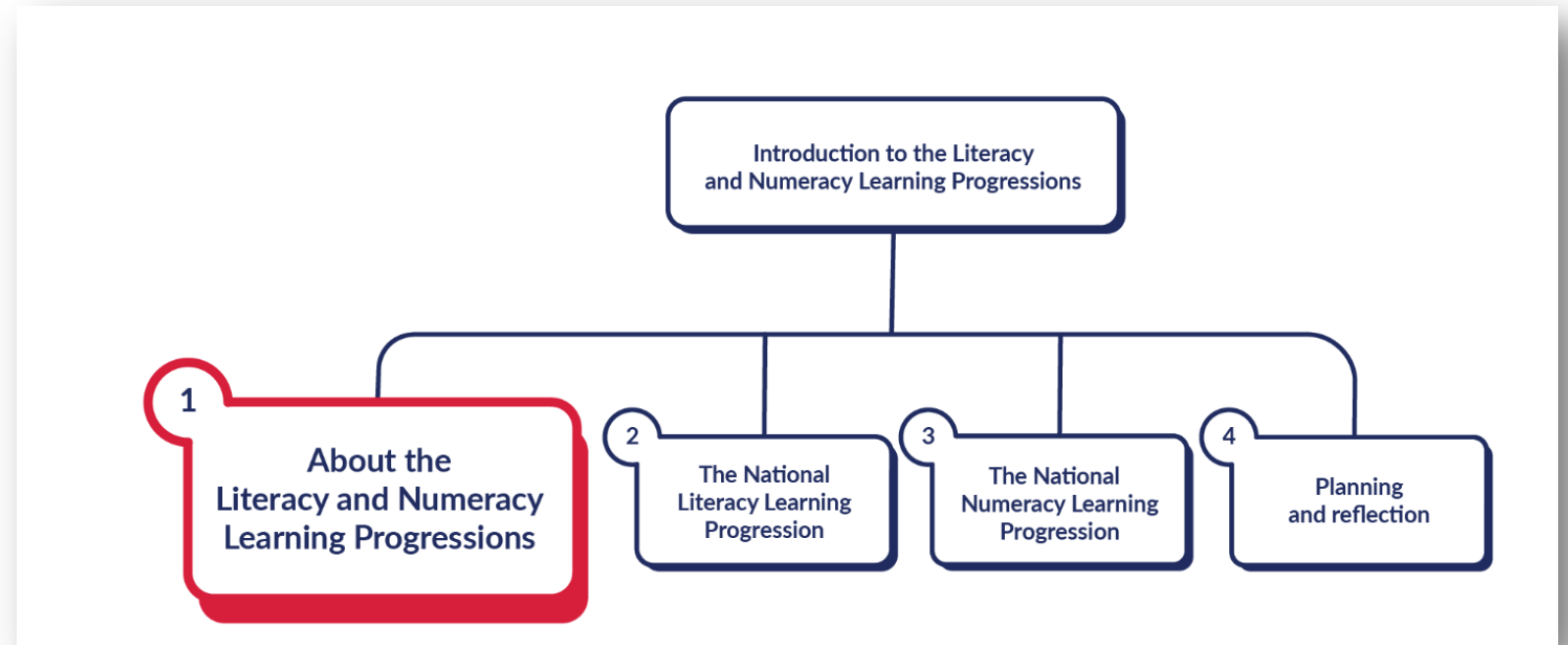
Introduction to the literacy and numeracy progressions



K - 10 

Introduction to the progressions

Online PL to support teachers to develop an understanding of the Literacy and Numeracy Learning Progressions.





NSW Department of Education

Numeracy guide

Kindergarten to Year 2

A guide to support conversations about evidence-based practice for leadership teams

Literacy and numeracy
2023 Update



NSW Department of Education

Numeracy guide

3 to 8

A guide to support conversations about evidence-based practice for leadership teams

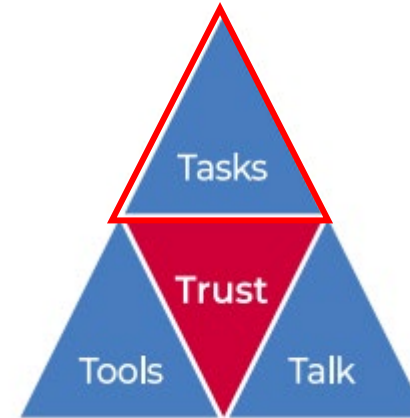
Literacy and numeracy
2023 Update



Teacher

To drive improvement in numeracy, a teacher:

- engages students in purposeful tasks and learning experiences that require deep thinking about important concepts and relationships
- creates an environment that encourages collaboration, educative risk-taking, meaningful talk, and uses students' misconceptions and errors as building blocks for learning
- provides play-based learning experiences that enable students to consolidate, practice, apply and transfer their numeracy skills
- designs opportunities for students to regularly experience productive struggle, exploring ideas and concepts to develop and use an increasingly sophisticated range of skills
- designs opportunities for students to practise what they are learning whether it be to improve fluency, problem-solving skills, or enrich conceptual understanding
- intentionally chooses and uses tasks because they meet a specific mathematical purpose, offering appropriate levels of challenge and opportunities for feedback for all students
- facilitates and plans productive classroom dialogue that encourages and supports students to justify their thinking and actions, drawing on a range of pedagogical practices and representational competencies
- supports students in connecting different strategies, approaches, representations, and concepts
- uses everyday experiences to design teaching and learning activities
- explores and uses multiple, meaningful representations to develop communicating skills, and understanding
- models how to work flexibly with numbers, operations and other critical ideas
- provides opportunities to use an ever-increasing range of representations
- builds on students' existing thinking through questioning and modifying tasks to provide alternative pathways to understanding
- plans learning experiences that enable students to build on their existing proficiencies, interests, confidence and experiences
- selects concrete materials/manipulatives that engages students in mathematical thinking to support them to represent mathematical ideas explicitly and concretely



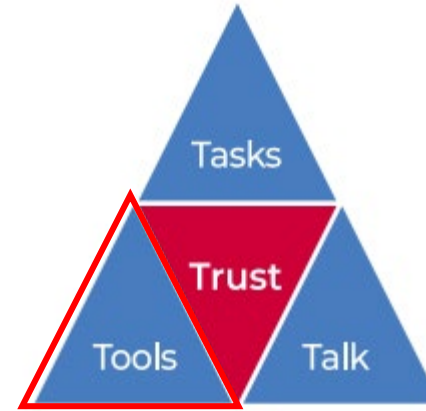
Transforming Primary Mathematics, Mike Askew (2016)

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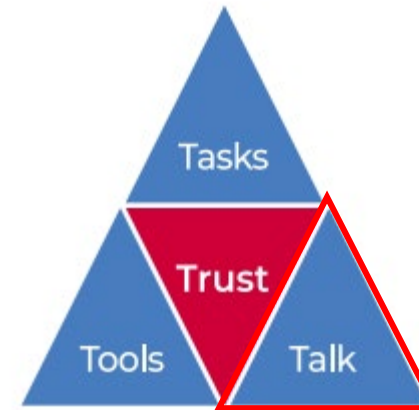
Transforming Primary Mathematics, Mike Askew (2016)

- selects concrete materials/manipulatives **(tools)** that engages students in mathematical thinking to support them to represent mathematical ideas explicitly and concretely

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Transforming Primary Mathematics, Mike Askew (2016)

- facilitates and plans productive classroom dialogue **(talk)** that encourages and supports students to justify their thinking and actions, drawing on a range of pedagogical practices and representational competencies

Number sense and place value

Number sense is considered a way of thinking about mathematical situations in order to make judgements, interpret data and communicate effectively (Booker, 2014).

Number sense can be described as:

'a person's general understanding of numbers and operations along with the ability and inclination to use this knowledge in flexible ways. Number sense is crucial for making mathematical judgements and developing useful strategies for handling numbers and operations' (McIntosh et al. 1997, p.3).

As such, number sense 'requires a deep knowledge of numbers and operations that can be used confidently and flexibly in multiple contexts, the capacity to explain and justify one's thinking and generalise, and an appreciation of pattern and mathematical structure.' (Siemon, Warren, Beswick, Faragher, Miller, Horne, Jazby, Breed, Clark and Brady, 2020, p.265).

Place value is foundational to developing a deep sense of number as students learn to appreciate the base 10 numeration system and that the value represented by a digit in a number is based on its position in the number. It is also about understanding the significance that '10 of these is one of those' and '1000 of these is 1 of those' (Siemon et al., 2019).

Number sense develops over a long period of time and requires meaningful, challenging experiences focussed on a broad range of critical ideas including:

- seeing mathematics as something we make sense of and use to share ideas
- noticing patterns and relationships
- making sense of numbers 0-9
- making sense of 10 and beyond (including place value)
- making sense of fractions (including decimals and percentages)
- using and making connections between different representations
- making sense of operations
- thinking multiplicatively.

Numeracy Guides

- Number sense and place value
- Patterns and algebra
- Additive thinking
- Multiplicative thinking
- Proportional thinking

Numeracy Guides

Syllabus and progression links

Number sense underpins all aspects of the NSW Mathematics K-10 syllabus. Achievement of outcomes in number and algebra is dependent upon students having strong number sense.

| NSW Syllabus | National Numeracy Learning Progression |
|---|--|
| <p>All teachers have a responsibility to support students to develop the general and discipline-specific numeracy requirements of students in their curriculum area. Numeracy is embedded throughout K-10 syllabus documents as a general capability. The capabilities can be found in syllabus documents, including Mathematics, Science and technology K-6, History, Geography and PDHPE. Numeracy is also embedded within Creative arts.</p> <p>Early Stage 1: MAO-WM-01, MAE-RWN-01, MAE-RWN-02</p> <p>Stage 1: MAO-WM-01, MA1-RWN-01, MA1-RWN-02</p> | <p>Early Stage 1: NPV1 – NPV4, CPr1 – CPr5 and NPA1 – NPA2</p> <p>Stage 1: NPV2 – NPV6 and CPr5 – CPr7</p> |

Further support

| Professional learning | Assessment tools and resources |
|--|---|
| <p>Becoming Mathematicians: How numbers and fractions work (Professional learning video with accompanying resource)</p> <p>Becoming mathematicians: Quantifying collections (Professional learning video with accompanying resource)</p> <p>Improving literacy and numeracy suite – Number and place value (primary)</p> <p>Quality curriculum implementation K-6 (microlearning modules focused on evidence-based practices that underpin the curriculum planning and programming, assessment and reporting process K-6)</p> <p>Mathematics K-6 microlearning (microlearning modules designed to support you with implementation of the Mathematics K-10 Syllabus (2022))</p> | <p>IfSR-Number and place value webpage</p> <p>Interview for student reasoning – Number and place value (IfSR-NP) diagnostic online assessment – ALAN</p> <p>Number knowledge resources</p> <p>Reading and numeracy resources URH</p> <p>National Numeracy Learning Progression</p> <p>How to – technical guide to using PLAN2</p> |

Universal Resources Hub



The screenshot shows the Universal Resources Hub interface. On the left is a navigation sidebar with options: Hub Resources, My Resources, My Collections, Community, Help & About, Settings, and Digital Learning Selector. The main header is dark blue with the NSW logo and 'Universal Resources Hub' text. Below the header is a search bar with a placeholder: 'Search on a keyword, "phrase (inc. quotation marks)", topic, NSW Syllabus or Australian Curriculum codes/descriptions'. There are filters for 'All', 'Saved searches', and a 'Clear all' button. Below the search bar are filter buttons for Type, Phase, Owner, SEF Alignment, Focus Area (selected), Stage, and Learning Area. The results section shows '187 results' and a 'Save this search' button. The results are sorted by 'Relevance'. Five resource cards are displayed, each with a red header and a white icon. The cards are: 1. 'Multiplicative thinking' (Teacher guide) with a lightbulb icon, 'Why? Let's justify: targeted discussion routine', Years: 1 2 3 4 5 6, Updated: 15 Dec 2022. 2. 'Multiplicative thinking' (Classroom resource) with a lightbulb icon, 'Multiplying and dividing decimals', Years: 5 6 7 8, Updated: 12 Dec 2022. 3. 'Fractions and proportional reasoning' (Classroom resource) with a pie chart icon, 'Proportional reasoning to solve ratio problems', Years: 7 8, Updated: 11 Dec 2022. 4. 'Number and place value' (Classroom resource) with a dice icon, 'Do you love chocolate?', Years: 5 6 7 8, Updated: 12 Dec 2022. 5. 'Fractions and proportional reasoning' (Classroom resource) with a pie chart icon, 'Solving problems involving ratios', Years: 7 8, Updated: 12 Dec 2022.

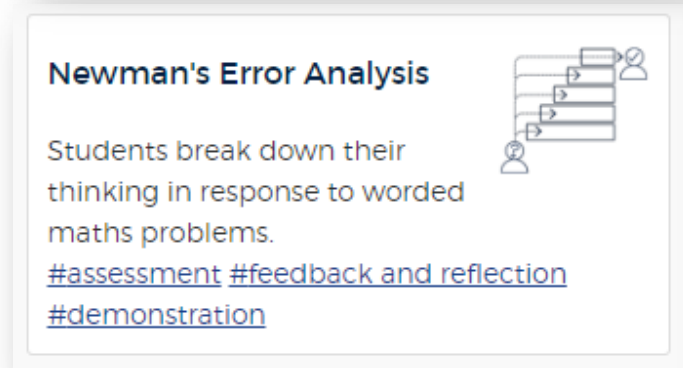
The thumbnail for the 'Numberless graphs' resource features a red background with a white bar chart and a pie chart. The text 'Probability and statistical reasoning' is written in white. Below the charts, there are icons for a thumbs up (5), a warning triangle (2080), 'Add to collection', 'Share via', and 'Go to resource'. The resource title is 'Numberless graphs', updated on 13 Dec 2022. It is a 'Document' format, suitable for 'Stage: 2, 3' and 'Year: 3, 4, 5, 6'. The 'Learning Area' is 'Mathematics, HSIE'. The description states: 'This Stage 2 and 3 resource supports students to read and interpret data. Numberless graphs are a teaching technique where information in a graph is slowly revealed to students. As they work through several noticing and wondering discussions, adjusting their thinking with each new piece of information, they develop a better understanding of the data story in both its whole and its parts.'

<https://education.nsw.gov.au/teaching-and-learning/curriculum/literacy-and-numeracy/resources-for-schools/hub>

Digital Learning selector



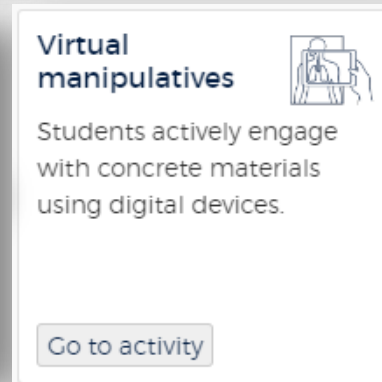

The banner features the NSW Government logo on the left, followed by the title "Digital Learning Selector" in large white text. Below the title is a navigation bar with three buttons: "Home", "Learning activities", and "Learning tools". The background is dark blue with a light blue curved shape at the bottom right and several small white dots.



Newman's Error Analysis

Students break down their thinking in response to worded maths problems.


[#assessment](#) [#feedback and reflection](#)
[#demonstration](#)



Virtual manipulatives

Students actively engage with concrete materials using digital devices.

[Go to activity](#)

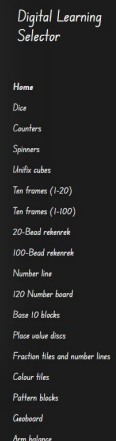


Visit the Digital Learning Selector for more virtual manipulatives

Mathematics virtual manipulatives

Virtual manipulatives, sometimes referred to as digital manipulatives, allow students to engage with concrete materials on digital devices to support their understanding of abstract ideas. They:

- support educators to differentiate lessons to address student learning needs and different learning styles
- provide opportunities for students to learn concepts in a developmentally appropriate, hands-on, experiential way
- enable students to develop problem-solving and reasoning skills, as well as reflect on their learning.



- Home
- Dice
- Counters
- Spinners
- Unitix cubes
- Ten frames (1-20)
- Ten frames (1-100)
- 20-Bead rekenrek
- 100-Bead rekenrek
- Number line
- 120 Number board
- Base 10 blocks
- Place value discs
- Fraction tiles and number lines
- Colour tiles
- Pattern blocks
- Geoboard
- Arm balance



Four icons representing different virtual manipulatives: dice, colored circles, a fraction wheel, and a bar chart.

Literacy and Numeracy Professional Learning

[Home](#) > [Teaching and learning](#) > [Curriculum](#) > [Literacy and numeracy](#) > Literacy and numeracy professional learning

Literacy and numeracy professional learning

The following professional learning resources are available to support teachers and school leadership teams in the teaching of literacy and numeracy in primary and secondary schools.

Note: Literacy and numeracy PL has been updated to version 3 of the National Literacy and Numeracy Learning Progressions and new syllabuses (where relevant).

Improving reading and numeracy suite PL

Numeracy

- Additive thinking (K-8) - MyPL course code [NR31670](#)
- Fractions and proportional reasoning (primary) - MyPL course code [NR31680](#)
- Fractions and proportional reasoning (secondary) - MyPL course code [NR31681](#)
- Measurement and geometric reasoning - MyPL course code [NR31673](#)
- Multiplicative thinking (K-8) - MyPL course code [NR31653](#)
- Number and place value (primary) - MyPL course code [NR31671](#)
- Number and place value (secondary) - MyPL course code [NR31675](#)
- Statistics and probability - MyPL course code [NR31672](#)

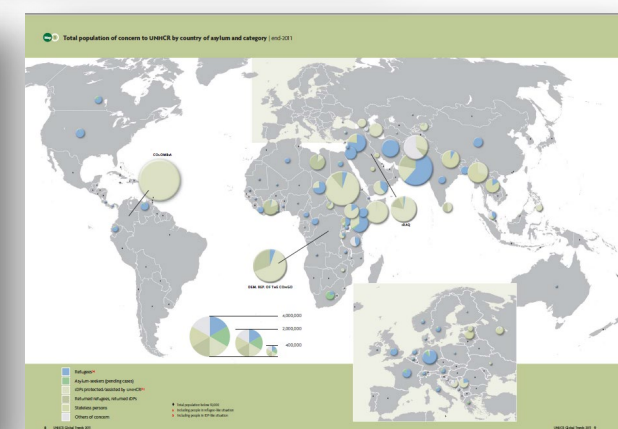
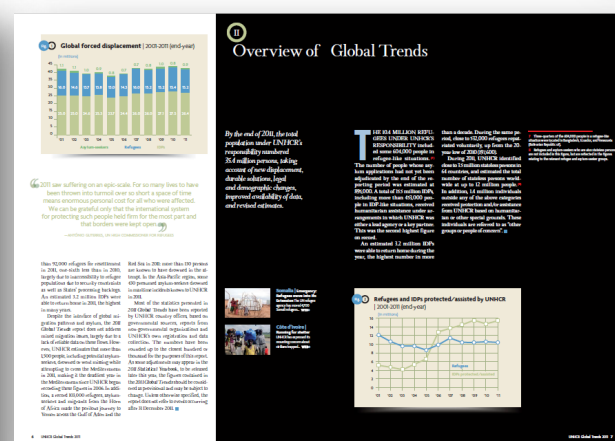
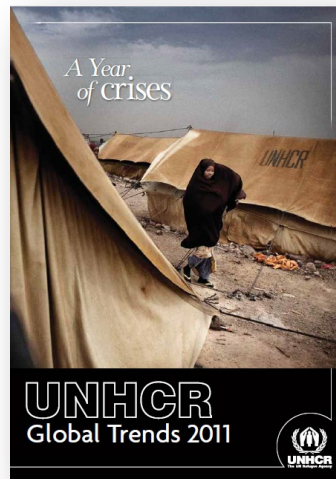
K - 10

Improving reading and numeracy suite

Online short courses to support reading and numeracy improvement priorities

English- Stage 5

In their position unit of work




Numeracy professional learning

Browse By

[All](#)
[Literacy](#)
[Numeracy](#)
[Program support](#)



Sort by
Name (A to Z) Filter



K - 8

Additive strategies: Blended learning



Assists teachers to develop student confidence in using flexible strategies for addition and subtraction.



3 - 8

Applying decimals across the curriculum



Assists teachers to support students to meet the decimal learning demands of their learning area.



K - 6

Challenging tasks and questioning



Unpacks teaching strategy for students in primary around challenging tasks and questioning.



7 - 10

Leading secondary numeracy



Supports numeracy secondary leaders to lead whole school numeracy initiatives aimed at improving student numeracy outcomes.



K - 8

Multiplicative strategies



Assists teachers to understand the development of multiplicative thinking.



3 - 12

Numeracy for EAL/D learners


Supports teachers to develop an understanding of EAL/D learners and pedagogy in the context of numeracy.



3 - 10

Understanding units of measurement

Assists teachers of Years 3 to 10 to support student improvement focused on measurement.



Literacy and numeracy

[Home](#) > [Teaching and learning](#) > [Curriculum](#) > Literacy and numeracy

Numeracy assessment in proportional thinking

Interview for Student Reasoning - Proportional thinking (IfSR-PT) now available

[Find out more](#)



Assessment resources

Assessments in this section support teachers to know more about students' literacy and numeracy skills at different stages throughout their schooling. Student responses are mapped to NSW syllabuses and the National Literacy and Numeracy Learning Progressions. Feedback from these assessments allow for targeted teaching that meets students' specific learning needs.

Resources are available to assist teachers to access and analyse assessment feedback, inform teaching and learning and communicate with parents and carers about student progress.

In this section

[Transition to Year 7 assessment](#)

The Transition to Year 7 assessment and new Scout reports replace Best Start Year 7 from 2023.

[Check-in assessment](#)

Reading and numeracy assessments available for students in Years 3 to 9.

[Best Start Kindergarten](#)

[Assessment](#)

A literacy and numeracy assessment for kindergarten students.

[Interview for Student Reasoning](#)

Assessments to support monitoring and feedback of numeracy skills.

[Phonics diagnostic assessment](#)

An on-demand assessment tool available to both primary and secondary teachers.

[Phonological awareness](#)

[diagnostic assessment](#)

An on-demand assessment tool available to both primary and secondary teachers.

[Spelling diagnostic assessment](#)

[trial](#)

A paper-based assessment assessing the ability to coordinate all three word forms when spelling.

[Stage based assessment](#)

Stage snapshots and short assessments to support monitoring and feedback of literacy and numeracy skills.

[Year 1 Phonics Screening Check](#)

A short assessment that tells teachers how students are progressing in phonics

HSC minimum standard

NSW Education HSC minimum standard

Home · Writing · Numeracy · Reading

HSC minimum standard resource

Classroom ready teaching and learning activities

About this resource

The HSC minimum standard teacher resource brings together a range of **classroom ready teaching** and **learning activities** to assist teachers to support students in **achieving** the **HSC minimum standard**.

Activities have been designed to assist schools in **targeting specific areas** of need relating to the focus areas of **writing, numeracy, and reading**.

Connections have been drawn to both the Australian Core Skills Framework and the National Literacy and Numeracy Progressions.

For an introduction to this resource and an explanation of its key features, **watch** the Supporting schools with the HSC minimum standard.

NSW Department of Education

- Division
- Multiplication
- Fractions
- Decimals
- Percentages
- Rates
- Time
- Ratio
- Area
- Length and perimeter
- Mass
- Volume and capacity
- Mean, median and m...
- Chance
- 3D Objects
- 2D Shapes
- Patterns
- Formulae and substit...
- Positioning and locating

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Contact us: literacy.numeracy@det.nsw.edu.au

