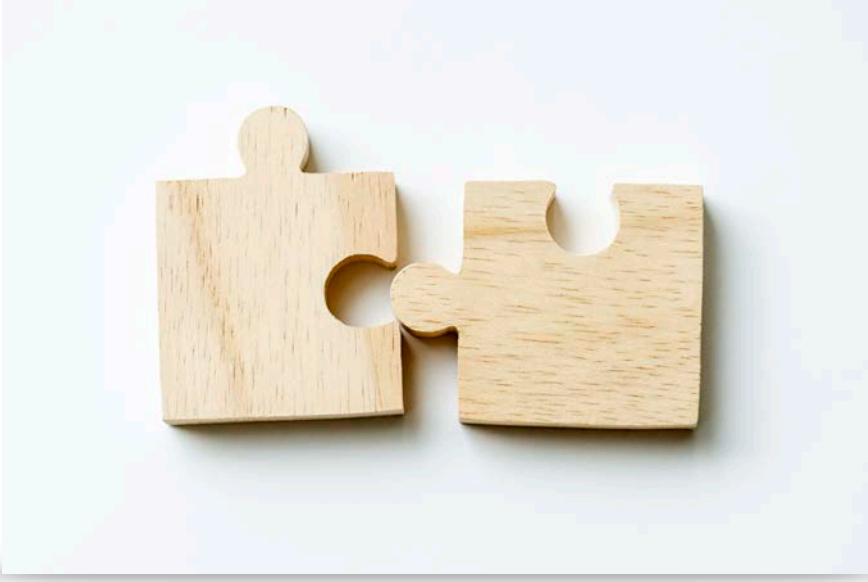
Content Clusters - Early Stage 1

Scope and sequencing by conceptual understanding

This is the scope… you create the sequence.

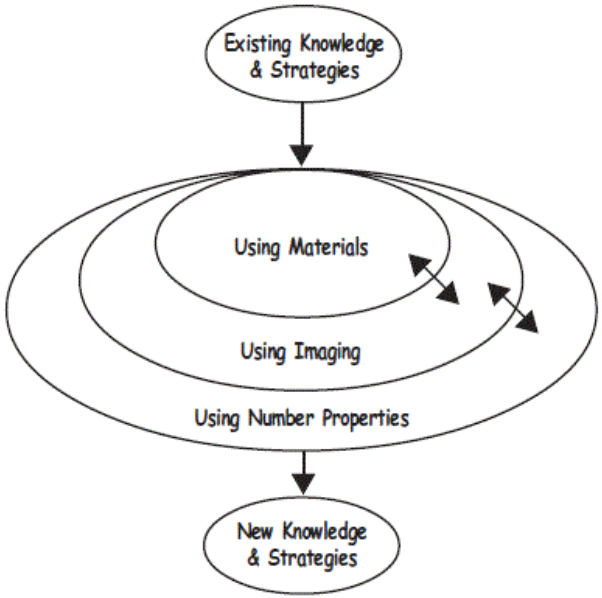


In this resource I provide possible ways of how groups of outcomes and their key ideas can be sequenced together based on the concepts they address. These are just examples and is not an exhaustive list of the clusters you can use to make connections across mathematics. I have used the syllabus outcomes, sub strands and the mathematics key ideas document.

When teaching for conceptual understanding (not just the knowledge of each sub strand) we need to make clear how the pieces of the mathematical puzzle fit together. To do this, our planning needs to reflect this belief- that mathematics is a complex web of interrelated ideas.

The scope of what we teach is described in the syllabus (this is the constant), the sequence of what and how we teach mathematics is a decision for individual teachers (this is the variable). These clusters can be used to create meaningful sequences of learning that focus on concepts and programs that still address common sub strands (across grades or classes) but allow for individual teachers to add additional key ideas or focus on specific aspects of the cluster that students either have misconceptions around or are developing conceptual understanding in. The clusters are numbered but are not written in teaching order. These clusters may be added to or updated in the future and newer versions will be released.

These clusters highlight the concept or main idea that ties each group of outcomes together, assisting teachers in making sense and meaning of the mathematics to students. When we think about the concepts or understandings first, we can think about what misconceptions students may have or what aspects of that concept they need next to connect their prior knowledge (the known) to create new knowledge (the unknown). The image to the right sourced from NZMaths, is based on Pirie and Kieren's growth in understanding model of the 'back and forth' nature of how students develop understanding from the known to the unknown.



A (scope and) sequence should:

- reflect the conceptual needs of your students at this point in time (they need to be evaluated and changed constantly)
- show evidence of connections across sub strands
- address connected content strands that deal with similar concepts within a lesson or within a sequence of lessons (e.g. over a few weeks)
- give teachers an overarching structure to guide immediate planning
- where possible, be written to address the upcoming half- term or term teaching and learning cycle

NESA states that for their review process as evidence of compliance schools need to provide "scope and sequence of learning/units of work in relation to outcomes of NESA syllabus for each KLA for each Year" (page 10).

Note: Most schools have a set, wider grade or school-based scope and sequence, you can use the content clusters within those parameters to guide what conceptual understandings you focus on for your students. They show where you can make connections between the sub strands that are listed in the school's scope and sequence.

References

Mathematics K-10 Syllabus outcomes © NSW Education Standards Authority (NESA) for and on behalf of the Crown in right of the State of New South Wales, 2012.

Pirie, S., & Kieren, T. (1994). Growth in mathematical understanding: How can we characterise it and how can we represent it? *Educational Studies in Mathematics, 26*(2/3), 165-190. doi:10.1007/BF01273662

Content Cluster 1: Counting (developing principles of number sense)			
Whole Numbers MAe-4NA Count forwards to 30 from a given number Count backwards from a given number in the range 0 to 20	***Addition and Subtraction MAe-5NA*** Combine two or more groups of objects to model addition		

Content Cluster 2: Counting to form groups (combining amounts and building number relationships)			
Addition and Subtraction MAe-5NA Combine two or more groups of objects to model addition Subitise small collections of objects	***Multiplication and Division MAe-6NA*** Investigate and model equal groups Record grouping and sharing using informal methods	***Patterns and Algebra MAe-8NA*** Sort and classify objects into groups	

Cluster 3: Sharing (using division) to represent fractions			
Addition and Subtraction MAe-5NA Take part of a group away to model subtraction	***Fractions and Decimals MAe-7NA*** Establish the concept of one-half Record halves of objects using drawings	***Multiplication and Division MAe-6NA*** Investigate and model equal groups Record grouping and sharing using informal methods	***Two-Dimensional Space MAe-15MG*** Sort, manipulate, make and draw circles, squares, triangles and rectangles

Content Cluster 4: Counting to compare quantities			
Addition and Subtraction MAe-5NA Combine two or more groups of objects to model addition Take part of a group away to model subtraction Compare two groups to determine 'how many more'	***Volume and Capacity MAe-11MG*** Describe capacity and volume using everyday language, including comparatives Compare volumes and capacities using direct comparison		

Content Cluster 5: Counting to sequence events			
Whole Numbers MAe-4NA Compare, order, read and represent numbers to at least 20 Read and use the ordinal names to at least 'tenth'	***Time MAe-13MG*** Compare and order the duration of events using everyday language Sequence events in time		

Content Cluster 6: Counting to sequence units			
Whole Numbers MAe-4NA Compare, order, read and represent numbers to at least 20	***Length MAe-9MG*** Identify the attribute of 'length' as a measure of an object from end to end Describe length and distance using everyday language, including comparatives Compare lengths using direct comparison		

Content Cluster 7: Classifying and describing items or objects (sorting)			
Three-Dimensional Space MAe-14MG Sort and manipulate three-dimensional objects found in the environment	***Two-Dimensional Space MAe-15MG*** Sort, manipulate, make and draw circles, squares, triangles and rectangles	***Position MAe-16MG*** Describe position using everyday language Use the terms 'left' and 'right' to describe position in relation to self	***Patterns and Algebra MAe-8NA*** Sort and classify objects into groups

Content Cluster 8: Representing quantities (oral, image/drawing, number, symbol)			
Whole Numbers MAe-4NA Compare, order, read and represent numbers to at least 20	***Data MAe-17SP*** Collect information about themselves and their environment Organise actual objects into data displays		

Content Cluster 9: Comparing features (e.g. size, shape)			
Three-Dimensional Space MAe-14MG Describe features of common three−dimensional objects using everyday language	***Two-Dimensional Space MAe-15MG*** Identify, name and describe circles, squares, triangles and rectangles presented in different orientations, in pictures and the environment	***Patterns and Algebra MAe-8NA*** Sort and classify objects into groups	

Content Cluster 10: Understanding equality			
Whole Numbers MAe-4NA Use the term 'is the same as' to express equality of groups	***Multiplication and Division MAe-6NA*** Investigate and model equal groups Record grouping and sharing using informal methods	***Fractions and Decimals MAe-7NA*** Establish the concept of one-half Record halves of objects using drawings	

Content Cluster 11: Compares quantities (numerical) and records findings (representations)			
Whole Numbers MAe-4NA Compare, order, read and represent numbers to at least 20	***Addition and Subtraction Mae-5NA*** Combine two or more groups of objects to model addition Record addition and subtraction informally	***Multiplication and Division MAe-6NA*** Record grouping and sharing using informal methods	

Content Cluster 12: Recognising patterns (starting with visual: shapes and objects)			
Patterns and Algebra MAe-8NA Recognise, copy, continue, create and describe repeating patterns of objects and drawings	***Whole Numbers MAe-4NA*** Subitise small collections of objects Use the term 'is the same as' to express equality of groups	***Two-Dimensional Space MAe-15MG*** Sort, manipulate, make and draw circles, squares, triangles and rectangles	***Position MAe-16MG*** Describe position using everyday language

Content Cluster 13: Relates objects to size, space and location			
Area MAe-10MG Identify the attribute of 'area' as a measure of the amount of surface	***Volume and Capacity MAe-11MG*** Identify the attribute of 'capacity' as a measure of the amount of substance a container can hold Identify the attribute of 'volume' as a measure of the amount of space an object occupies	***Mass MAe-12MG*** Identify the attribute of 'mass' as a measure of the amount of matter in an object	***Position MAe-16MG*** Give and follow simple directions Describe position using everyday language

Content Cluster 14: Compares quantity or size (linear) (using estimation) records findings (representations)			
Whole Numbers MAe-4NA Count forwards to 30 from a given number Count backwards from a given number in the range 0 to 20	***Length MAe-9MG*** Describe length and distance using everyday language, including comparatives Compare lengths using direct comparison Record comparisons of length informally	***Area MAe-10MG*** Describe area using everyday language, including comparatives Compare areas using direct comparison Record comparisons of area informally	***Position MAe-16MG*** Describe position using everyday language

Content Cluster 15: Compares quantity or size with objects (using estimation) records findings (representations)			
Whole Numbers MAe-4NA Count forwards to 30 from a given number Count backwards from a given number in the range 0 to 20	***Area MAe-10MG*** Describe area using everyday language, including comparatives Compare areas using direct comparison	***Volume and Capacity MAe-11MG*** Describe capacity and volume using everyday language, including comparatives Compare volumes and capacities using direct comparison Record comparisons of capacity and volume informally	***Mass MAe-12MG*** Describe mass using everyday language, including comparatives Compare masses directly by hefting Record comparisons of mass informally

Content Cluster 16: Represents information visually			
Data MAe-17SP Organise actual objects into data displays Interpret data displays made from objects	***Whole Numbers MAe-4NA*** Compare, order, read and represent numbers to at least 20 Use the term 'is the same as' to express equality of groups		

Content Cluster 17: Applies number sense to money			
Whole Numbers MAe-4NA Compare, order, read and represent numbers to at least 20 Use the language of money	***Addition and Subtraction Mae-5NA*** Combine two or more groups of objects to model addition Take part of a group away to model subtraction Compare two groups to determine 'how many more'		

Content Cluster 18: Relates durations of time to events and representations (e.g. clock)			
Whole Numbers MAe-4NA Compare, order, read and represent numbers to at least 20	***Time MAe-13MG*** Connect days of the week to familiar events and actions Tell time on the hour on digital and analog clocks	***Fractions and Decimals MAe-7NA*** Establish the concept of one-half	