| **SCOPE AND SEQUENCE** | Mathematics — Years 1 to 9 | **ALGEBRA** |  | **DRAFT** |
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| **Scope and sequence** identifies what should be taught and what is important for students to have opportunities to learn. It describes the *knowledge* that students need for ongoing learning in Mathematics. This knowledge is presented as *Concepts and facts* and *Procedur*es.The scope and sequence:* is provided for each year of schooling
* should be used together with the *Essential Learnings*
* provides additional detail in each Organiser
* informs the focus of Mathematics in assessment
* is a key document for school curriculum planning.
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| **Prep** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** | **Year 9** |
| ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** | ***Concepts and facts*** |
| * Own patterns
* Repeating patterns have a discernible unit of repetition
* Non-patterns
* “Balance” on scales
* Sameness of collections (equivalence)
 | * Simple rules for repeating patterns () and increasing patterns ()
* Inverse of the rule, e.g. subtraction undoes addition
* Equivalence collections
 | * Repeating patterns
* Increasing and decreasing patterns:
	+ skip counting
	+ repeated addition, or subtraction
* Missing values in patterns
* Simple rules:
	+ pattern of 2, 3, 4, or 5 objects (repeating patterns)
	+ based on addition or subtraction
	+ (increasing and decreasing patterns)
* Equivalent collections: different combinations and arrangements for the same number value, e.g. 5 and 3 and 4 and 4 are equivalent
* Non-patterns, patterns with errors
 | * Number patterns and sequences:
	+ repetition, order
	+ regular increases and decreases
	+ rules based on previous terms
		- Simple relationships between objects and numbers:
	+ order (the second value depends on, is a function of the first value)
	+ sequence
	+ arrangement
	+ equivalence
 | * Space and number pattern rules, including patterns with decimals
* Relationships between quantities including equivalence
* Arithmetic properties:
	+ commutative
	+ associative
	+ distributive
* Inverse operations
 | * Number pattern rules using the four operations
* Predictions of change using relationships, e.g. with the previous term as in the Fibonacci sequence
* Generalisations built on:
	+ commutative property
	+ associative property
	+ distributive property
	+ inverse operations
 | * Equations using addition, subtraction
* Order of operations: the appropriate sequence of operations used in calculations
* Input–output rules
* Ordered pairs (discrete data)
* Relationships:
	+ variables
	+ simple equations
 | * Equations, expressions and formulae using addition, subtraction and multiplication
* Order of operations
* Ordered pairs (continuous data)
* Relationships:
	+ variables
	+ equations
 | * Equations
* Algebraic expressions involving the four operations
* Variables (discrete and continuous) and constants
* Ordered pairs (four quadrants)
* Linear and non-linear equations related to real-life problems
 | * Algebraic expressions involving reciprocals, whole number powers and square roots
* Algebraic relationships modelled using integer, decimal and fraction values of variables
* Functions
* Simple simultaneous linear and non-linear equations
 |
| ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** |
| * Comparison of collections:
	+ quantity, size
* Sorting
 | * Order
* Comparison of collections:
	+ same as
	+ different
* Translation of patterns: actions to objects
 | * Order
* Comparison of collections:
	+ balance
	+ equal to
	+ same
	+ different from
* Translation of patterns: objects to numbers
* Elements or terms of a pattern and the position in the pattern
 | * Equations:
	+ unknowns
	+ equivalence
 | * Comparison of data sets
 | * Comparison of relationship in pictorial and concrete materials, e.g. changes in perimeter with changes in the area
 | * Comparisons of simple algebraic expressions and relationships,e.g. energy bars costs $2 each, cost equals number x 2
 | * Comparisons of simple algebraic expressions and relationships,e.g. constant walking speed at 4 km/h
 | * Comparison of linear and non-linear graphs
* Conservation of equivalence
 | * Conservation of equivalence
 |
| * Estimation
 | * Estimation
* Mental strategies:
	+ guess and check
 | * Estimation
* Mental strategies:
	+ guess and check
	+ backtracking (inverse relationship between addition and subtraction)
 | * Estimation
* Mental strategies:
	+ guess and check using addition and subtraction
	+ backtracking
 | * Estimation
* Mental strategies:
	+ guess and check
	+ inverse of operations (addition and subtraction, multiplication and related division facts)
	+ backtracking
 | * Estimation
* Mental strategies:
	+ guess and check
	+ inverse of operations (addition and subtraction, multiplication and division)
	+ simplify, manipulate and calculate expressions, e.g. 72 ÷ 3 is the same as 60 ÷ 3 plus 12 ÷ 3
	+ backtracking
 | * Estimation
* Mental and written strategies:
	+ guess and check
	+ equivalence
	+ backtracking
 | * Estimation
* Mental and written strategies:
	+ guess and check
	+ commutative property
	+ associative property
	+ distributive property
	+ inverse property
 | * Estimation
* Mental, electronic and written strategies:
	+ for manipulation of expressions and equations
	+ guess and check
	+ commutative property
	+ associative property
	+ distributive property
	+ inverse property
	+ substitution
	+ simplifying
	+ collecting like terms
	+ expanding
 | * Estimation
* Mental, electronic and written strategies:
	+ for manipulation and rearrangement of expressions and equations
	+ guess and check
	+ commutative property
	+ associative property
	+ distributive property
	+ inverse property
	+ substitution
	+ rearrange, e.g. rearrange p = 3q – 2 to obtain 3q = (p+2)

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| * Concrete materials:
	+ computers
	+ manipulative materials (everyday objects, balance scales)
	+ actions, sounds
* Verbal:
	+ increasing and decreasing sequences in songs and rhymes
	+ predictions of change
	+ pattern rules
	+ patterns descriptions
	+ descriptions of same collections
* Written:
	+ recording patterns, e.g. drawings
* Visual:
	+ photographic records of patterns
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials (everyday objects, balance scales)
	+ actions, sounds
* Verbal:
	+ same as in groups
	+ equal to a group
	+ counting patterns
	+ backtrack
* Written:
	+ symbolic: equals (=)
	+ groups of repeating elements
	+ electronic
* Visual:
	+ photographic records of patterns
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials (everyday objects, balance scales)
	+ actions, sounds
	+ function machine (input–output) to describe a rule
* Verbal:
	+ simple rules for increasing, decreasing patterns and repeating patterns
	+ number sentences
	+ predictions and statements
	+ the use of an element in patterns, e.g. 12th element in a red, green pattern
	+ explanations of reasoning, calculation strategies and reasonableness of solutions
	+ mathematical language: equal to, same as, not equal to, different from, missing addend
* Written:
	+ symbols
	+ list
	+ input–output table

|  |  |
| --- | --- |
| **Input** | **Output** |
| No. Apples | Cost |
| 1 | 50c |
| 2 | $1.00 |
| 3 | $1.50 |

* Visual:
	+ drawings
	+ calculator constant function
	+ hundred board
	+ picture graphs
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials (everyday objects)
	+ function machine, manipulative materials
* Verbal:
	+ descriptions of patterns, rules and relationships
	+ attributes of equivalence
	+ generalisations about changes between elements and continuing patterns
	+ explanations of reasoning, calculation strategies and reasonableness of solutions
* Written:
	+ symbolic: equals (=), does not equal (≠), unknowns (shapes, boxes, question marks, spaces, lines)
	+ equations in words
	+ table of values
	+ graphs
* Visual:
	+ pictorial materials
	+ calculators
	+ hundred board
	+ picture and bar graphs
	+ lists
	+ tables
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
* Verbal:
	+ rules for spatial and number patterns
	+ explanations of reasoning, calculation strategies and reasonableness of solutions
	+ mathematical language: same, different, more, less, equal, not equal, greater than, less than
* Written:
	+ symbolic: greater than (>), less than (<), unknowns (shapes, boxes, question marks, spaces, lines)
	+ equations
	+ lists
	+ tables
	+ picture and bar graphs
* Visual:
	+ pictorial materials
	+ graphs
	+ lists
	+ tables
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
* Verbal:
	+ positions in patterns from rules, e.g. 20th term in the pattern 3, 6, 9, 12 … will be 60 as 20 x 3 = 60
	+ explanations of reasoning, calculation strategies and reasonableness of solutions
* Written:
	+ symbolic: x/÷, +/-
	+ equations
	+ words
	+ lists
	+ tables
	+ line graphs
	+ graphs (manual and electronic )
* Visual:
	+ pictorial materials
	+ graphs
	+ lists
	+ tables
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
* Verbal:
	+ strategies for calculations
	+ descriptions of rules
	+ predictions
	+ explanations of reasoning, calculation strategies and reasonableness of solutions
	+ mathematical language: discrete, continuous, trends
* Written:
	+ symbols and letters
	+ words
	+ ordered pairs
	+ brackets
	+ graphs (manual and electronic )
	+ calculations
* Visual:
	+ tables of values
	+ commercial graphs
	+ arrow diagrams to sequence procedures
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
* Verbal:
	+ strategies for calculations, and to maintain equivalence
	+ descriptions of patterns in words, explanations of generalisations, e.g. why (2 x 6) + (3 x 6) = 5 x 6 generalises to (2 x n) + (3 x n) = 5 x n
	+ predictions
	+ justifications of reasoning, calculation strategies and reasonableness of solutions
* Written:
	+ symbols and letters
	+ tables
	+ ordered pairs
	+ graphs (manual and electronic)
	+ calculations
	+ diagrams and arrow diagrams
* Visual:
	+ tables of values
	+ other people’s graphs
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
* Verbal:
	+ strategies for calculations, and to maintain equivalence
	+ predictions and generalisations
	+ justifications of reasoning, calculation strategies and reasonableness of solutions
	+ mathematical language: variable, dependent, independent, trend
* Written:
	+ symbols and letters
	+ models
	+ tables
	+ ordered pairs
	+ graphs (manual and electronic )
	+ calculations
	+ different representations of linear and non-linear equivalences
* Visual:
	+ tables of values
	+ commercial graphs
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
* Verbal:
	+ strategies for calculations, and to maintain equivalence
	+ predictions and generalisations
	+ justifications of reasoning, calculation strategies and reasonableness of solutions
	+ constant rates of change
	+ effect of varying values
	+ reference to gradients and *y* axis
	+ rule of the function
* Written:
	+ symbols and letters, e.g. y = mx + c
	+ models
	+ tables of values for linear and simple non-linear functions
	+ ordered pairs
	+ graphs (manual and electronic )
	+ calculations
	+ different representations of linear and non-linear equivalences
* Visual:
	+ commercial graphs
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