| **SCOPE AND SEQUENCE**  | Mathematics — Years 1 to 9 | **SPACE** | **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*** |
| * Straight and curved lines in shapes and objects, e.g. curved line on a ball and circle and straight sides on a die and a square
 | * 2D shapes: circle, triangle, rectangle (including squares)
* 3D objects: cube, rectangular prism, sphere, cone, pyramid, cylinder
* Simple properties of 2D shapes
	+ straight and curved lines and surfaces
	+ number of sides
	+ number of corners
* Simple properties of 3D objects, e.g. shapes of faces
 | * Families of shapes
* Geometric properties of shapes
	+ angles in turns
	+ nets of a cube
	+ depth in 3D objects
* Symmetry: a line or plane dividing images into two congruent shapes
	+ folded and cut pictures
	+ flips, slides, turns
 | * 2D shapes names: square, rectangle, triangle, and circle
* 3D objects: prism, pyramid, cone, cylinder and sphere
* Geometric properties
	+ angle, line of symmetry
 | * Quadrilaterals:
	+ parallelograms
	+ rectangles
	+ trapeziums
	+ rhombuses (including diamonds)
* Nets of prisms, pyramids, cylinders, cones
* Geometric properties of shapes:
	+ lines (horizontal, vertical, oblique, parallel and non‑parallel)
	+ equal sides, faces
	+ angles (straight 180º, right 90º)
* Symmetrical, asymmetrical shapes
* Tessellating properties of triangles and quadrilaterals
* Enlargements and reductions
 | * Polygons: a plane figure with three or more sides, non‑polygons
* Triangles:
	+ right-angled
	+ isosceles
	+ scalene
	+ equilateral
* Geometric properties of shapes:
	+ vertex, edge, base
	+ parallel sides, faces, lines
	+ perpendicular sides and lines
	+ angles (acute, obtuse, straight, reflex)
* Prediction of shapes from nets using visualisations
* Symmetry
* Tessellations involving transformations
 | * Regular and irregular polygons:
	+ triangles
	+ quadrilaterals
	+ pentagons
	+ hexagons
	+ octagons
	+ dodecagons
* Specialised names of prisms and pyramids
	+ by their base shape, e.g. square-based pyramids, hexagonal prism
	+ tetrahedrons
* Sphere, hemisphere
* Geometric properties:
	+ equal base angles, diagonals of a polygon
* Symmetry:
	+ lines
	+ planes
	+ points
	+ rotational and angle of rotation
 | * 2D shapes: circles (including concentric, non-polygons, e.g. ellipse)
* 3D objects: plans, nets, isometric view
* Part of 2D shapes, e.g. semicircle, quadrant
* Composite shapes, e.g. 4-, 5-, and 6-pointed stars are made of a number of distinct shapes
* Geometric properties:
	+ sum of internal angles
	+ circles (radius, diameter, centre, circumference, chord, tangent)
* Symmetry:
	+ lines of
	+ points of
	+ planes of
	+ rotational (including angle of rotation)
* Congruent shapes have the same shape and size
* Transformations: reflection, rotation and translation
* Points
* Lines
 | * Cross-sections of prisms and pyramids parallel or perpendicular to base
* Shapes produced by repeating regular geometric shapes (Platonic solids), e.g. cube, tetrahedron, octahedron, dodecahedron, icosahedron
* Shapes embedded within other shapes
* Parts of 3D objects, e.g. truncated cone
* Composite 3D shapes, e.g. octahedron (two square-based pyramids)
* Line segment and midpoint
* Angles:
	+ formed by intersecting lines, e.g. opposite, supplementary, complementary angles
	+ external angles: properties of external angles of (triangles, polygons)
* Congruence
* Similarity
* Perspective drawings
 | * Complex geometric shapes:
	+ curved surfaces
	+ compound shapes as objects combined to make a single object, e.g. embedded shapes
* Cross sections of shapes:
	+ partitions of circles, e.g. sectors, segments, annulus
* Specifications:
	+ boundary, angle and scale
* Sequences of transformations
* Proofs:
	+ angle properties associated with parallel, perpendicular and transverse lines and polygons, e.g. when two straight lines intersect, opposite angles are equal
	+ sum of interior angles
 |
| ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** |
| * Classification by:
	+ shape name, e.g. circle
	+ single attribute, e.g. things that roll
 | * Classification of shapes using one or two defining features
* Comparison of shapes:
	+ defining features
	+ common features
	+ different features
 | * Classification using geometric names and defining properties
* Comparison of:
	+ different nets of a cube
	+ of 2D shapes and 3D objects, connections and differences
	+ folded or cut images
* Partition of 2D shapes, e.g. triangles within a square, rectangle
 | * Classification using geometric names and defining properties
* Comparison of:
	+ shapes for one line of symmetry
	+ angles, e.g. bigger than, smaller than
 | * Classification using geometric names and defining properties
* Relationship between symmetry and flip
* Preservation of symmetry in flips, slides, and turns of objects
 | * Classification using geometric properties
* Shapes within shapes
* Angles within angles
 | * Estimation of angles
 | * Classification using geometric conventions, e.g. length, angle size, relationships between faces
* Comparison of shapes by superimposing them through a sequence of transformations
* Connections between transformations, tessellations of suitable shapes in the plane and points, lines and planes of symmetry
 | * Constructions using geometric tools for perpendicular lines, 90º angles, 60º angles, and to bisect an angle
* Composite constructions based on known properties, e.g. construct a rhombus given lengths of two diagonals
* Link symmetry, congruence, similarity of shapes with transformations, tessellations in the planes and on surfaces and informal proofs
 | * Construction and manipulation of complex geometric shapes, e.g. soccer ball from net of stitching pattern involving tessellations of hexagons and pentagons
* Construction from isometric drawings
* Comparison of geometric properties of families of shapes for congruence or similarity
 |
| * Concrete materials:
	+ computers
	+ manipulative materials (familiar shapes and objects)
* Verbal:
	+ everyday language: straight sides, curved lines, straight lines
* Written:
	+ straight and curved lines within drawings
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ everyday examples of 3D objects, e.g. ice-cream cones, balls, die,
	+ everyday examples of 2D shapes, e.g. a window in a drawing of a house
	+ 3D object constructions
	+ puzzles
* Verbal:
	+ descriptions of shapes
	+ mathematical language: names of 2D shapes
* Written:
	+ sketches of 2D shapes and 3D objects from different viewpoints
	+ 3D objects have different orientations
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials (3D objects)
	+ mirrors
	+ ruler for drawing straight lines
* Verbal:
	+ defining features of families of 2D shapes and 3D objects
	+ 3D objects: shape and number of faces, function
	+ 2D shapes: number of sides, number of corners
	+ common characteristics of 2D shapes, e.g. length, width
	+ common characteristics of 3D objects, e.g. length, width, depth, height
* Written:
	+ drawings and electronic representations of shapes in different orientations and turns
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials (puzzles)
	+ mirrors
	+ construction of 2D shapes and 3D objects
	+ repeating patterns
* Verbal:
	+ mathematical language: angle, line of symmetry
	+ 2D shapes: number of sides, number of angles
* Written:
	+ drawings and electronic representations of 2D and 3D objects
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials (models of 3D objects)
	+ mirrors
* Verbal:
	+ descriptions of features using appropriate spatial language and families of shapes
* Written:
	+ conventions for labelling shapes and lines
	+ arrows to identify parallel lines
	+ dotted lines to represent hidden lines in 3D objects
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ nets of 3D objects
* Verbal:
	+ descriptions of features and broad family groups
* Written:
	+ symbols for angles
	+ different viewpoints and orientations
	+ conventions for labelling shapes and angles
	+ letters for naming 2D shapes (ABC … )
	+ marks to identify equal sides of shapes, equal angles, and right angles,
	+ patterns
	+ designs
	+ tessellations
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ pair of compasses and straightedge protractor
* Verbal:
	+ mathematical language: congruence
* Written:
	+ symbolic: congruent ()
	+ simple compass constructions, e.g. isosceles triangle
	+ conventions for labelling shapes and angles
	+ congruent markings on segments and angles
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials, e.g. multi-link cubes
	+ mirrors
	+ geometric drawing tools
	+ geometry software
* Verbal:
	+ descriptions of symmetry and transformations in patterns
	+ mathematical language: congruent, non-congruent shapes, properties of shapes
* Written:
	+ accurate drawings and using geometric conventions, tools and technologies
	+ mosaic patterns from plans drawn to scale
	+ plans, nets, isometric diagrams and grid drawings
	+ drawings of 3D objects and composite shapes from different viewpoints and orientations
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ mirrors
	+ geometric drawing tools
	+ cross-sections
* Verbal:
	+ sum of internal angles
	+ informal proofs
* Written:
	+ sketches, drawings or electronic images of cross sections
	+ compass construction to bisect a line segment
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ geometric drawing tools
	+ plans
	+ nets
* Verbal:
	+ descriptions of complex geometric shapes using geometric conventions and properties, e.g. diagonals of a rhombus bisect each other at right angles
	+ deductions supported by proofs, e.g. proof that lines are parallel
* Written:
	+ sketches, accurate drawings or electronic images of complex geometric shapes from specifications and with geometric conventions,e.g. symbols to indicate parallel lines, perpendicular lines and congruent lines
 |
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| * Visual:
	+ photographs and drawings of familiar shapes and objects
	+ “mind pictures” of different shapes
* Positions and their opposites in immediate environment
* Directions to locate positions or objects
 | * Visual:
	+ shapes within shapes
	+ folding
	+ cutting
	+ joining halves
	+ shapes within pictures
	+ illustrations
	+ “mind pictures”’ of different shapes
* Turns change direction
* Non-verbal information,e.g. gestures and simple treasure maps from familiar board or electronic games
 | * Visual:
	+ paper-folding
	+ different orientations and viewpoints
	+ ‘mind pictures’ of different viewpoints of shapes, and movement of shapes
* Left and right turns change direction
* Estimates of informal measurements in movements:
	+ steps
	+ grid spaces
 | * Visual:
	+ partial 2D shapes and 3D objects and different orientations
	+ angles in familiar objects
	+ “mind pictures” of different viewpoints of shapes, and movement of shapes
* Relative size within maps
* Turns: quarter, half, three‑quarter and full, more than or less than a quarter turn, clockwise, anticlockwise
* Estimates of informal measurements in movements:
	+ paces
	+ grid spaces
 | * Visual:
	+ enlargements and reductions of shapes
	+ transformations of 2D shapes
	+ paper-folding techniques for symmetry
	+ “mind pictures” of different viewpoints of shapes, and movement of shapes Directional north (⭡N)
* Mapping conventions:
	+ symbols
	+ legends
	+ alphanumeric grids
 | * Visual:
	+ “mind pictures” of the construction sequence of 3D objects from nets
* Four major compass points
* Mapping conventions:
	+ symbols
	+ compass points labels and directional arrow for north
	+ scale, e.g. 1 cm represents 10 m
	+ legends
	+ alphanumeric grids
 | * Visual:
	+ tessellations using iterative single transformations
	+ isometric view
* Distance between locations
* Angle as a change in direction
* Mapping conventions:
	+ grid references: poles, key lines of reference on globe and flat map of earth,e.g. equator, prime meridian, international date line
	+ coordinates
	+ compass points: north (N), south (S), east (E), west (W), north- east (NE), south‑east (SE), north-west (NW), south-west (SW)
	+ scale
* Basic orienteering conventions
 | * Visual:
	+ lines of symmetry, e.g. the plane containing the equator on a globe
	+ origami design, paper-folding
* Mapping conventions:
	+ coordinates
	+ compass points
	+ scale
* Eight compass points: N, S, E, W, NE, SE, NW, SW
 | * Visual:
	+ 3D objects from different viewpoints (nets, isometric , location of viewer, e.g. top, side, front)
	+ perspective: one-point, two‑points
* Distance between grid references
* Mapping conventions
	+ ratio scale on maps (1:250)
* grid references
	+ latitude
	+ longitude
 | * Visual:
	+ isometric and perspective drawings
* Bearings in whole degrees
* Mapping conventions:
	+ scale
	+ coordinates
	+ bearings
	+ angles
	+ keys
	+ annotations
 |
| ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** | ***Procedures*** |
| * Position of self in relation to other objects, e.g. on the chair, under the roof, behind Lachlan and in front of the teacher
 | * “Mind pictures” to assist plans for movement
 | * Position relative to known landmarks
* “Mind pictures” to assist plans for movement
 | * Comparison of sketched maps and commercial maps of the same environment
 | * Connection between the amount of turn and change in direction from north, e.g. half a turn from facing north is facing south
 | * Connection between four compass points and the amount of turn or angle
* Estimation of distances in relation to scale
 | * Connection between eight compass points and the amount of turn or angle
* Estimation of distances
 | * Connection between eight compass points and the amount of turn
* Estimation of distances
 | * Interpretations of maps using scale, coordinates, features distance and orientations
* Comparison of alternative pathways between locations
* Estimation of distances
 | * Relationship between flat maps and globe
* Measurement of bearings measured clockwise from north
* Estimation of bearings in degrees
* Calculations of distances using scale
 |
| * Concrete materials:
	+ computers
	+ manipulative materials
	+ familiar environments
* Verbal:
	+ directions using position language
	+ everyday language: here, there, on, off, forward, backward, on, under, in front of, behind, inside, outside, in, out
* Written:
	+ simple line drawings representing a map
* Visual:
	+ photographic of familiar environments
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ community environments
* Verbal:
	+ feedback on and improvement of directions
	+ everyday language:

- over, under- up, down- left, right- forwards, backwards- sideways- on below- between- beside- near- before, after- full, half and quarter turns* Written:
	+ signs and symbols
	+ simple line drawings representing a map
* Visual:
	+ electronic maps and plans
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ grids
* Verbal:
	+ explanations of the construction and interpretation of directions
	+ everyday language: left/right of, long way from, close to
* Written:
	+ simple sketches of maps and plans on grids
* Visual:
	+ electronic maps including grids and plans
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ maps of familiar environments
	+ grids
* Verbal:
	+ informal distances in directions
	+ descriptive directions
	+ factors assisting precision and interpretation of directions
* Written:
	+ sketches of simple maps and plans on grids
* Visual:
	+ electronic maps including grids and plans
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ treasure map
	+ room plan
* Verbal:
	+ turns in directions
* Written:
	+ drawings and electronic of maps from different viewpoints, e.g. from above as in “bird’s-eye-view” with mapping conventions
* Visual:
	+ electronic maps and plans
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ maps and plans of schools and local area for interpretation
* Verbal:
	+ spatial language to specify directions
* Written:
	+ manual or electronic maps and plans with conventions and straightforward scale, e.g. legend and symbols for direction
* Visual:
	+ electronic maps and plans
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ commercial maps and plans
	+ globe
* Verbal:
	+ directions to specific locations
	+ calculation of distance between grid reference points
* Written:
	+ manual or electronic maps and plans with conventions
* Visual:
	+ simple orienteering maps and directions
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ commercial maps and globe
	+ shopping centre plans
* Verbal:
	+ directions for specific locations and movement from one location to another using flat maps and the globe
* Written:
	+ calculation of distance between locations
	+ manual or electronic maps and plans with conventions and scale
* Visual:
	+ other people’s maps and plans
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ flat maps, topographical maps and globes
* Verbal:
	+ precise directions for specific locations and movement from one location to another
	+ critical analysis of alternative pathways and distances between locations
* Written:
	+ calculation of enlargement, reductions using scale
	+ manual or electronic maps and plans with conventions and scale, e.g. floor plans with scale
	+ calculations of distances between locations
* Visual:
	+ commercial floor plans
 | * Concrete materials:
	+ computers and other electronic devices
	+ manipulative materials
	+ flat maps including world, atlas, street directory and orthophoto
	+ amusement park maps and location guides
* Verbal:
	+ specify locations and descriptions of spatial relationships
* Written:
	+ manual/electronic maps and plans with conventions to represent location
	+ distance and orientation on grids
	+ plans and elevations with scale
* Visual:
	+ orienteering maps and directions
 |